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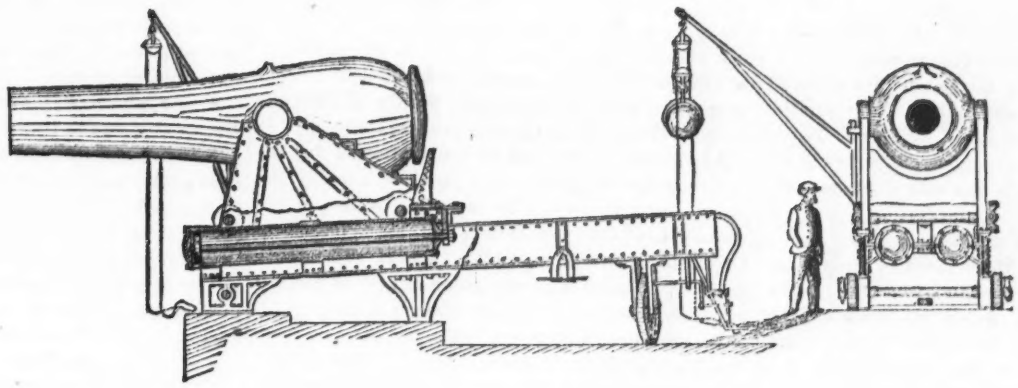
The Government Gun Carriage.

THE construction of carriages for heavy guns offers to the mechanical engineer one of those problems, the solution of which in itself, may make a reputation. It would be almost impossible to speak too forcibly of the difficulties to be overcome. The guns themselves are of enormous weight—from twelve to fifty tons, the charges of powder are from 10 to 120 pounds, and a force is suddenly developed by the explosion which lifts the huge weapon, and, if allowed to, could throw it bodily through the air. To overcome this resistance the engineer must use the simplest combinations, for multiplication of parts means weakness. Numbers of devices have been employed, among which are counterpoises, friction surfaces and spring buffers. The friction surfaces or so-called "compressors," invented and first used by Captain ERICSSON, have received the most favor. We illustrate this week a method proposed for adoption in our army. It is a pneumatic carriage, the recoil being taken up by the compression of air.



THE GOVERNMENT GUN CARRIAGE.

As will be seen from the engraving, the apparatus consists merely of two pistons, the rods of which are attached to the *gun*, moving in cylinders which are fastened to the *carriage*. These cylinders are 8 feet long and 14 inches in diameter and they are placed under the gun and within the carriage, so as to be entirely out of the way. It is evident that the resistance to the movement of the gun increases as that movement approaches its end, a state of things the reverse of that in most of the mechanical carriages. Other improvements not shown in the engraving, enable one man to throw the carriage into gear and run it "in battery."

The Narrow Gauge Convention.

This convention, which had before it one of the most interesting subjects of the day, met at St. Louis, June 19. The committee, who were to report on the peculiar advantages of the narrow gauge system, made some very valuable points. They first presented the following resolution :—

Resolved, That, having found the three-feet gauge so numerously represented in this convention, they recommend that it be adopted as the standard narrow gauge by all the roads where there are no particular reasons for adopting a less gauge.

1st. Because a uniform gauge is very essential to the final success of the system ; and

2d, Because they believe that, if it is adopted on all narrow-gauge roads, it will not be many years before the three-feet standard roads will have through-connections North, East, South and West, with a better system of interchange of cars, and a less amount of transfer than there is now on the 4 feet 8½ inch of the north, the five feet of the south, and other gauges now in operation.

They also recommend the adoption of twenty-four inches as the standard height for the centre of draw-head above the rail.

COMPARATIVE COST.

In regard to the comparative cost of the two systems, they say :

"Taking what are called first-class roads, equipped to do the business of the various localities through which they run, your committee feel justified in the following conclusions :—

1. In very rough mountainous countries where the transportation is of heavy ores, such as gold, silver, copper and other minerals in bulk, before being reduced, so as to collect the same at the various smelting works, with the coal, wood and fluxes used in the reduction and manufacture of the same, and where it is not necessary to run fast or time trains; that the cost of construction of a three-feet gauge road will not be over one-fifth of such roads as the Erie, Pennsylvania Central and Baltimore and Ohio.

"That in the broken, rolling country where most of our roads are constructed, the saving will be about as 1 to 2, namely : That the narrow gauge will cost about one-half as much as the present broad gauges have cost.

"That in the slightly undulating prairie or plains country the cost of construction of a first-class narrow-gauge passenger road, with the equipment suitable for a large freight, as well as passenger business, will not exceed three-fifths of what a broad-gauge would cost, with what is now called first-class equipment and road-bed ; and that the real comforts and safety of the narrow gauge are fully equal to those on the great government roads, viz. : the Union Pacific, Kansas Pacific and the Central Pacific."

DEAD WEIGHT.

In discussing the proportion of dead to paying freight, the committee, among other statistics, take the average number of passengers to one car in New York, in 1870. This was thirteen. Allowing, then, thirteen passengers to one broad-gauge car, weighing 38,000 pounds, we have 2,923 pounds dead weight to each passenger. Thirteen passengers in a narrow-gauge car, weighing 12,000 pounds, have 923 pounds of dead weight to each. The difference is 2,000 pounds.

As to freight, an 18,500 lb. car, broad gauge, carries 20,000 lbs., while an 8,000 lb. car, narrow gauge, carries 16,000 lbs. But the real advantage of the new system lies in the fact that the cars of no road are on the average full. In Massachusetts and New York the actual amount of freight was less than one-sixth the capacity of the cars run. The committee justly say that they cannot hope for such a press of business in a new country as in those old States, and their condition must, therefore, be worse than that of the roads in New York and Massachusetts. In transporting less quantities than a full car load the narrow-gauge cars have immensely the advantage. Cars carrying through-freight may be loaded very generally to their capacity, but the average net car loads are brought down by the necessity for dropping cars from the trains at turn-outs along the route with way or local freights, frequently very small in proportion to the full car load. The committee showed, by a comparative table, that if it is necessary to drop cars with nine tons of freight, at a way-station—this being an amount which is one ton over a car-load for the narrow gauge, and which renders necessary the use of two cars at the utmost disadvantage—the dead weight is then only 1,777 pounds per ton, and still 278 pounds less than the broad gauge.

WEAR AND TEAR.

As to the wear and tear, the committee say that if we assume that the repairs of machinery and rolling stock are in direct ratio to its cost, the reduction for

the narrow gauge would be about 50 per cent., which is the difference in the first cost. The lightest broad-gauge coach weighs about sixteen tons, or 32,000 pounds, empty, and hammers the rail joints with 4,000 pounds on each wheel. When loaded and driven over the rails at twenty-five or thirty miles per hour, the weight of the blow is enormous, and terribly destructive to the superstructure, crushing out the best rail in five or six years. The passenger car of a three-feet gauge would only hammer the rail with 1,500 pounds per wheel.

The same truth applies to locomotives. A thirty-ton locomotive, and its loaded tender, weighing about seventeen tons, or a total of forty-seven tons, will exert a pressure of nearly six tons on each driving wheel. When driven at a high speed, the strain upon the track is terribly destructive.

The "Fairlie" engine, constructed for narrow-gauge lines, bears its whole load including wood and water, on the driving wheels, thus utilizing the whole weight in the work of hauling the train. Instead of an engine carrying 47 to 50 tons, to obtain the power of 20, we have an engine weighing 20 tons and no more; and this load distributed over eight wheels, with a pressure of 2½ tons per wheel, instead of nearly 6 tons as with the broad gauge.

The saving of dead-weight transported is so much saved from the grand total of this destructive agency, and by the reduced weight upon each wheel, no single blow of such enormous force can be given on the narrow gauge. We leave this point with a single illustration, showing the total of the forces expended upon a defective joint on one side of the track, by the passage of a train of fifty passengers on either gauge. The joint is supposed to have yielded, so that the wheels fall into it with a perceptible shock. In an example, selected for calculation, it results that the wide gauge train will have inflicted a series of blows, amounting in the aggregate to 6,891,840 pounds, while the narrow train will have expended a force amounting to only 3,248,640 pounds.

The narrow gauge may be operated for about 25 per cent. less than the broad gauge, and where the proportion of expenses to gross receipts is 70 per cent., the ratio of the narrow-gauge expenses to receipts would be 52½ per cent. and with strict economy probably as low as 45.

WORK OF ENGINES.

As might be expected the committee reported in the affirmative on the question, whether narrow gauge engines capable of doing the work can be made. They cite examples of work done on existing lines. The locomotives of the Denver and Rio Grande narrow-gauge railway, both freight and passenger, are giving entire satisfaction, both as to speed and power. A seventeen ton freight locomotive on that road has hauled a train of twenty-four cars with ease up a grade seven miles long, averaging ten feet in the mile, four miles of the same having a grade of 75 feet per mile.

GROSS WEIGHT OF TRAIN.

4 empty 8 wheeled box cars, 8,000 lbs each		32,000
12 empty 8 wheeled platform cars, 6,000 lbs. each		72,000
8 loaded 8 wheeled platform cars, 6,000 lbs each	48,000	
And load on same, 16,000 lbs. each	128,000	176,000
Total		280,000

Pounds, or 140 tons; and this over a new track. Add the weight of the locomotive, 17 tons, and we have a total gross tonnage of 157 tons.

A 12 ton passenger locomotive has hauled the following load up the same grades on schedule time, viz.: 15 miles per hour:

5 platform cars, 6,000 pounds each	30,000
And load (rail) on same 16,000 pounds each	80,000
	110,000

pounds, or 55 tons; add weight of locomotive and we have a total of 67 tons.

But a still more remarkable performance was that of one of its passenger locomotives that ran 181 miles with only 2,340 pounds of coal, hauling the usual train of one baggage car and two coaches. Of this distance, 102 miles were run up an average grade of 40 feet per mile, and 8 miles of 75 feet per mile.

The passenger trains on that road have frequently been driven at a speed of 30 miles per hour with entire safety, and with less oscillating motion than is observable on broad gauge roads newly constructed.

How will the saving in first cost and dead weight affect the rates of freight and passage?

We have at this time about 60,000 miles of broad gauge railway in operation in the United States.

These railways have cost from $20,000 to $60,000 per mile. Estimating their average cost at $40,000 per mile they represent $2,400,000,000.

Had we originally adopted the narrow gauge at half the cost of the broad, the expenditure would have been $1,200,000,000, leaving an equal amount for investment in manufactures or other enterprises.

Or with the $2,400,000,000 invested in the narrow gauge, it would have given us 120,000 miles in active operation to-day. It needs no argument to demonstrate that if we had double the number of miles in operation that we now have, our resources would be developed much more rapidly than is now being done.

Neither does it need any argument to prove that had our railways cost us only from $10,000 to $20,000 per mile, it would have cost less to operate them, and that our general interests would have been advanced in a corresponding degree.

The cheaper the first cost of the road, machinery and rolling stock—provided they be ample for the business offering—the lower the rates, and the consequent rapid development of all interests.

The great want of the age is cheaper transportation; and this we cannot have without cheaper railways.

The average cost of transporting freight by the broad gauge may be estimated at 1½ cents per ton per mile, and on the narrow gauge 1 cent. One ton transported 200 miles, at 1½ cents per ton per mile will cost $3, and at 1 cent. $2—a saving of $1, or 33⅓ per cent., in favor of the narrow gauge.

Estimating the cotton crop of the Southern States, at 4,000,000 bales per annum, and the average cost of transportation at $3 per bale, we pay $12,000,000 freight per annum on this one product alone.

Admitting that the cost of transportation by the narrow gauge would be one-third less than by the broad gauge, it would effect a saving to the producers of $4,000,000 per annum; or for a period of twenty-five years $100,000,000, a sum sufficient to build 10,000 miles of narrow gauge railway at $10,000 per mile, or 5,000 miles at $20,000 per mile.

We have been able to give but a few extracts from the report, which is quite long, but have given enough to show how the committee treat the subject, and what their conclusions are. That narrow gauge is to be a law for out of the way, and unsettled regions there seems to be no reasonable doubt. Railroads of this kind do not need to resort to argument in order to establish their usefulness. They have the history of successful undertakings behind them. The questions of first cost, maintenance and running expenses in comparison to the broad gauge need more data for their thorough elucidation, and we can afford to wait for a little more experience.

As to the need of cheap roads, that is beyond the necessity of argument. We see whole territories, such as Colorado, for instance, hampered and almost helpless, without a road. If all the mine owners in that territory were to form a company, and engage an engineer to set their affairs in order, probably the first item in his report would be the absolute necessity of easy and cheap transportation. And the same is true of most mining fields.

The convention has done its work well. Its proceedings were marked by the conviction of a great future, and we have no doubt that it will enjoy one.

Separating Silver from Lead.

A patent, dated September 13, 1871, No. 2,413, was granted by the English Patent Office to M. Henry of 68 Fleet street, London, for separating silver from lead. Desilvering is effected by zincing; based on multiplying the metal surfaces to be acted on by oxidation. There are three crystallizations of the ternary alloy (lead, silver and zinc). An acoustic electric signal marks the termination of each stage. The lead, after eliquation, is superheated and showered into a chamber in which it is treated with superheated air. The products pass into condensation chambers, and the metal flows into moulds which prepare it for transference into boilers or cauldrons into which zinc is introduced. Next, boilers or cauldrons heated by a travelling furnace receive the metal which is again zinced, hot air being injected from the stationary furnace. A syphon carries the lead into another receiver. The zinciferos dross may enriched, remelted, and chloruretted, green timber being used to expedite the process. The rich litharge and the chloruretted litharge may be used for making chloride of lead. The æriform products of the desilvered lead may be utalized.

Elasticity of Iron.

A remarkable illustration of the effect of intense strain on cast-iron is described in the English papers, the subject of the experiment being a cast-iron cylinder ten and five-eighths inches thick, fourteen and one half inches high, with an external diameter of some eighteen inches. It was requisite, for a specific purpose, to reduce the internal diameter to three and one-half inches, and this was effected by the insertion of a small cast-iron cylinder into the center of the large one; and, to insure some initial strain, the large cylinder was expanded by heating it, and the internal cylinder being first turned too large, was thus powerfully compressed.

The inner cylinder was partly filled with pewter, and a steel piston being fitted to the bore, a pressure of nine hundred and seventy-two tons was put on the steel piston. The steel was "up set" by the pressure, and the internal diameter of the small cylinder was increased by full three-sixteenths of an inch—that is, the diameter became three and eleven-sixteenths of an inch.

A new piston was accordingly adapted to these dimensions, and in this state the cylinder continues to be used, and to resist the pressure. The external layer of the inner cylinder was thus permanently extended 1-5 of its length. Under these high pressures, when combined mechanically, cast-iron, as well as other metals, appears, like liquids, to exert an equal pressure in every direction in which its motion is opposed.

Ammonia in Gas.

The President of the British Association of Gas Managers, in his address at the late meeting, said that when the Metropolitan gas referees, appointed by the Board of Trade, were first appointed they fixed 5 grains of ammonia per 100 feet of gas as a maximum, and from the experiments they have made, and also from the actual working of some of the metropolitan companies, they find it practicable to manufacture gas quite free from ammonia. They consequently gave notice to the companies that on and after the 1st of November of last year the maximum quantity of ammonia allowed in the gas was to be reduced from 5 to 2½ grains, and they now further hint that the standard will be reduced to *nil* ere long. They state that the process of purifying gas from ammonia consists mainly in bringing the gas into contact with water, which has a remarkable affinity for it, and is capable of absorbing above 700 times its own volume, and the most perfect process of ammonia purification is that which does its work with the least amount of water. The reasons given are—first because when much water is used it absorbs a portion of the hydrocarbons: second, because the ammonia so formed is too weak to be saleable; and third, that in consequence of this, the liquor has to be returned and passed through the scrubber several times to bring it up to the required strength, whereby the impurities with which the water is charged are again brought in contact and

a · by the gas. At these works 20 gallons of ammoniacal liquor of 10 ozs. strength are obtained from each ton of coal, showing that the gas from each ton of coal contains about one-tenth of 1 per cent. of ammonia gas ($N H_3$). In other words, there is one foot of $N H_3$ in every 1000 feet of gas.

At the Blackfriars works the condensers yield per ton of coal about nine gallons of 6 ozs. liquor, and the scrubbers yield eleven gallons of 14 ozs. strength, so that in this case one-third of the ammonia is taken out by the condensers and two-thirds by the scrubbers. But the ammoniacal liquor obtained from the condensers is too weak to be saleable, hence it has to be mixed with the stronger liquor obtained from the scrubbers. The requisite commercial strength of the liquor is about 10 ozs. ; if the liquor is much below that strength it is objectionable from its bulk, whilst, if it is much above that strength, it is objectionable as a saleable commodity, owing to its tendency to lose a portion of its ammonia by volatilization.

Economical Results in the Treatment of Gold and Silver Ores by Fusion.(1)

BY JOHN A. CHURCH E. M.(2)

AT a time when the treatment of gold and silver ores by fusion in opposition to the mill process is attracting so much attention in this country, it may be useful to consider what is done in a well-conducted foreign works. For this purpose I will ask you to accompany me to Lend in Austria a small but thoroughly organized establishment. It is situated in the Salzburg Alps, and receives its ore from the mines at Rauris and Boeckstein. The former lying 8200 feet above the sea is said to be the highest mine in Europe, some of its openings being made in glacier ice. It was worked by the ancients who have left the contracted and tortuous passages peculiar to them.

The ore differs in no way but extreme poverty from countless mines in the West. It consists of gneiss, quartz, chlorite and clay slate ; containing iron pyrites, copper pyrites, arsenical pyrites, galena, blende, and stilbite or sulphuret of antimony. The gold is found in two states : free gold and gold alloyed with silver. This alloy, in 1866 was composed on the average, of 15·34 gold and 84·67 silver, which gives a specific gravity of 11·28. Mercury has a specific gravity of 13·6, and as the amalgamation of gold by the Austrian method, is looked upon as a proceeding entirely mechanical, the separation being effected solely by the superior gravity of the gold over mercury ; this alloy which is lighter than mercury cannot be amalgamated.(3) Such is the lesson of long practice, the free or fine gold being extracted from a part of the ore, at least, by amalgamation while the tailings are smelted to obtain the alloy. The following table will show the proportion of fine to alloyed gold and also exhibit the extreme poverty of the ore. To the Rauris and Boeckstein ores are added those from Zell in the same part of the Alps. The ore from the last named place is not now worked, the point of poverty having apparently been reached at which the auriferous rock ceases to be an *ore*.

	Rauris In 2000 lbs. Troy ounces.	Boeckstein In 2000 lbs. Troy ounces.	Zell In 2000 lbs. Troy ounces.
Fine Gold	0·32—0·48	0·038—0·113	0·090—0·097
Aurifer Silver	14·0—14·7	5·709—6·690	unimportant.
Iron pyrites, copper pyrites, galena	8 per cent.	4½ per cent.	unimportant.
Value of Silver & Gold in American coin	$13.49—$16.92	$5.91—$8.49	$1.86—$2.00

As in 1866 Boeckstein delivered 63 per cent. of the ore smelted at the works, and Rauris 37 per cent. ; the average value for that year was $10·28 or 0·0003 per cent. gold and 0·047 silver. This does not include the value of the copper and lead which form respectively 2 per cent. and 1 per cent. of the ore. The former is extracted, the latter is not sufficient to supply the waste of the process and lead has to be bought for the works. Even in Europe these ores are considered extremely poor. I am not aware that ores from veins as poor as these have ever been utilized in this country, but if they have they owe their value to the fact that the gold is all fine and can be amalgamated.

TREATMENT OF THE ORE.

The ore is first sorted to six varieties for the furnace and one for amalgamation. The former are quartzose ore, rich, medium and poor, compact pyrites, galena and antimonial ores.(4)

The quartzose ore consists mostly of quartz with which are gneiss and chlorite; it contains iron pyrites, arsenical pyrites, blende, copper pyrites, and a very little galena. Its value in gold and silver is 400-2240 grammes to the ton, or 12 to 70 oz. Of this alloy from 10 to 30 per cent. is gold. This ore gives 20-25 per cent. of raw matte.

Compact pyrites is composed, of ferric oxide, arsenical pyrites, and copper pyrites, and these are often accompanied by magnetite, when it is usually richer. It is nearly free from gangue. Its content varies between 80 and 400 grammes of gold and silver to the ton ; or 2·5—12 ounces. The gold forms about 25 per cent. of the alloy.

Glaserz, is a name given to a mixture of quartz and gneiss with disseminated pyrargyrite ; silver and antimony sulphide ; antimony glance and galena. Its content varies very much, usually between 800 and 2000 grammes, or 26—60 ounces, to the ton, of which 25 per cent. is gold. Most of this comes from Boeckstein.

Glance ore, or fine leaved galena, with 4000 or 5000 grammes, or 140—160 ounces of silver, almost without gold, to the ton.

The *Glaserz* occurs oftenest in quartz ; copper pyrites and occasionally peacock ore, in chloritic gneiss; blende, iron pyrites and arsenical pyrites in quartz and gneiss.

The mill slimes are of three qualities, ; 1 and 2 are nearly pure pyrites, having been concentrated in milling, and giving 50—60 per cent of matte. One contains 500—1500 grammes of alloy, of which 7—14 per cent. is gold ; two contains 22—75 grammes alloy of which 2·5—4 per cent. is gold ; three is the poorest slime from the shaking table. It gives 25—30 per cent. of matte, and contains 300—1000 grammes or 10·—40 ounces of alloy, of which 9—18 per cent. is gold. It is used as a siliceous flux. Only the poorest ore containing merely traces of pyrites is sent to amalgamation ; which is done because it there undergoes concentration.

The ore for amalgamation is stamped under stamps of 220 pounds weight (total) through sieves of 1.5 mm. (0.06 inch), the stamp chest having a sieve on each side to secure the most rapid discharge of the slime possible. Two methods of treatment are employed for the slimes :—1. They are first concentrated and then amalgamated ; or, 2. They are first amalgamated and then concentrated. With ore that contains much pyrites the former is best ; with ores very poor in pyrites, the latter.

Amalgamation takes place in pans, there called "mills." They are 24 inches in diameter at the top, 16 inches at the bottom, 9 inches high and cast of 1-8 to 3-16 inch iron. They are not directly conical, but the side forms a step 2 inches wide. In this pan mercury is poured to the depth of 1 inch, and a wooden block, shaped like the pan, but 1-1·5 inch less in diameter is suspended over it. The upper part of the block is hollowed out like a hopper, and the under side has small pieces of sheet iron placed radially in it, which just clear the mercury. When this block is revolved and a stream of slime run into the hopper-like depression in its upper surface, the slime is carried over the mercury, from the centre to the circumference of the pan, the whole apparatus acting like a "centrifugal" pump. This is the Austrian gold mill so often described (5). Great care is taken to prevent too rapid a motion of the stream which would not allow the gold time to settle, and would also carry off mercury. Twelve to thirty-two revolutions a minute is the speed given, according to the fineness of the ore, thickness of the slime, and amount of gold present. These mills extract by one operation 75 per cent. of the fine gold, and 15 per cent. more by repeating the process. Each mill passes about one ton of ore in 24 hours. Compared with blankets, this system does not appear to present any advantages in the first handling of the ore ; but I should think the Austrian mill might be substituted with gain in the place of many other amalgamating arrangements now used after the blankets.

Compared with the Colorado methods, these mills extract 20 per cent. more than the Colorado amalgators, though this yield necessarily depends upon the per centage of silver in the native gold. They require little watching, except when used immediately after the stamps, when the accumulation of gold might necessitate cleaning up every two or three days.

Smelting.—For four years the ores delivered for fusion were in the following proportions :—

	From Rauris.	From Boeckstein.
Quartzose ore	6 50	24.11
Compact pyrites	0.06	0.48
Sulphuret of Antimony	1.41	0.41
Slime from Amalgamation	29.03	38.00
	37.00	63,00

About 60 per cent. of the ore has therefore been amalgamated.

From the table of values before given, it is evident that 70—75 per cent. of the ore is worthless rock, and this must be removed before adding lead, which would suffer serious loss if charged with so much quartz. The operations are therefore as follows :—

1. Fusion for raw matte.
2. Roasting of raw matte in stalls.
3. Fusion (without lead) for a more concentrated matte.
4. Roasting of 2nd matte in stalls.
5. Fusion with lead.
6. Cupellation of rich lead.

The First Fusion.—Eleven years experience has proved that the most efficient scoria is one approaching the composition of a bisilicate. The following is an analysis of a scoria from the first fusion :—

Silica	51.02
Alumina	2.16
Oxide of Iron	19.75
Lime	15.40
Magnesia	8.57
As. Mn. Ca.	
Zn. S. by dif.	3.10
	100.00

The furnace is not new and contains none of the late improvements ; but it does good service. Its general dimensions are as foliows :—

Height	28 feet.
Diameter of hearth	3 ,,
,, boshes	4 ,,
,, throat	2 ,,
Number of tuyeres	2 ,,
Pressure of blast	⅛—½ in. of mercury.

From 100 to 120 bushels of charcoal are required to warm the furnace, and then regular charges of 5 cubic feet, or about 3 bushels are thrown in. In blowing in, the quantity of mixed ore and flux added to this quantity of charcoal is, at first 56 pounds, then 112 pounds, and finally when the furnace is thoroughly hot, 203 pounds, which is the constant burden of mine to three bushels of charcoal. This is usually reached in the first 24 hours. Four hours after the first charge of ore and flux the blast is turned on, at first with a pressure of ¼ in., and then ½ in. mercury ; or one-sixth and one-quarter pounds pressure. After eight hours the scoria begins to flow. The furnace is worked with a black throat.

1 Read before the Institute of Mining Engineers May 22, 1872.

2 For the information contained in this paper I am indebted to Dr. LEO TURNER, former director of the works, now at Brixlegg in the Tyrol.

3 See Rittinger, "Aufbereitung" page 469 ; Ed. 1867.

4 A collection exhibiting these ores and a full suite of the furnace products can be seen at the New York School of Mines.

5. RITTINGER's is the best account. See his "Aufbereitung."

The labor per ton of ore and flux amounts to 1.8 days.

The First Matte, forms 40 to 45 per cent. of the charge, the difference between this proportion and the 20 to 30 per cent. afforded by the ore being made up by roasted matte which forms a part of the charge. Its average composition is:—

Iron	55.1
Copper	4.3
Zinc	3.7
Lead	2.1
Nickel Cobalt Arsenic and Antimony	4.5
Sulphur	27.9
	97.6

It contains 30 to 40 ounces Troy of auriferous silver to 2,000 pounds; or in American valuation $100 to $150 in coin. From the fact that the ore is unroasted, and the metals are therefore so well "covered" by sulphur, the loss in this operation amounts to only one-quarter of one per cent. About 38 bushels of charcoal are used to the ton of charge, and 9.75 tons are smelted in 24 hours.

The Second Fusion.—The first matte is roasted three times in stalls containing 28 tons, the roasting not being thorough, but carried on'y so far as to leave about 40 per cent. of unroasted matte. It is then resmelted with quartz, and to avoid the use of too much of the latter, a basic scoria is made containing about 22 per cent. silica. This requires very great care in managing the furnace, for the least irregularity of working will cause the formation of sows. To secure proper working, whenever the furnace is tapped, the hearth is examined by means of a bent bar. If lumps are felt the front wall is broken out, and they are removed; if the sole is slippery the presence of reduced iron is indicated. A rough, hard, even sole is the proper one.

The pressure of blast is now reduced to one-sixth of an inch or one-twelfth of a pound to the square inch; the hearth is 10 to 12 inches larger in diameter than before, and the charge is increased to 222 pounds to 3 bushels of charcoal. These changes have for their object not only the prevention of iron sows but also of speise, a compound of arsenic with all the other metals, very difficult to utilize. The same precautions are used in blowing in as before. About 30 bushels of charcoal are used to the ton of ore and flux, and 13.5 tons are fused in 24 hours. The second matte, contains 52.67 ounces of auriferous silica to 2,000 pounds, worth about $200.

Fusion with Lead.—The second matte is roasted as before, but now 50 to 60 per cent. of raw matte is left. A stronger roasting would so enrich it that two fusions with lead instead of one, would be necessary. The scoria is again basic and, to keep the heat as low as possible, the pressure of blast is reduced to one and one-half lines of mercury, while the charge is increased to 277 pounds of matte and flux to 3 bushels of charcoal. In order to keep the lead in contact with the matte as long as possible, as well as to decrease the heat, the crucible is made a foot deeper than before. The new scoria has an average composition of

Silica	27.45
Oxide of Iron	56.52
Lime	10.19
Magnesia	3 48
Aluminia	1.25

The loss will not exceed 2.5 per cent. of the lead. When the hearth is full of melted matte and lead, it is tapped, the products running into a basin where they are well stirred with poles. The matte is then partially taken off, the lead remaining until 600 to 700 pounds has collected.

For a perfect extraction of the silver, it is necessary to charge 120 to 130 pounds of lead for each pound of silver and gold. With this proportion, 75 per cent. of the silver and gold are extracted in one operation, and the matte ought not to contain more than 0.75 per cent. of lead. The extraction of 75 per cent. of auriferous silver, means that 90 per cent. of the gold and 73 per cent. of the silver has been obtained. The absolute loss of these metals is but 0.10 of one per cent. From 14 to 16 tons are smelted in 24 hours. A certain amount of lead matte is obtained which is charged back in the same operation. Of charcoal, 28 bushels to the ton are used. If the matte is rich enough, it now undergoes a repetition of this operation, but usually it is so poor that it is treated immediately for copper. If, however, it contains less than 35 per cent. of copper, it is roasted and charged as a flux, in the first operation for raw matte. At Lend the conditions are such that this takes place every other year, copper being made one year and matte the next. The labor amounts to 0.46 days per ton of matte and flux, and the loss of lead is about 24 pounds to the ton of matte.

Cupellation is performed in a German furnace with a moveable hood, made very low. Inasmuch as none of the side products are sold, and there is no need of having them in great purity, there is beside the fire bridge, but one opening in the hearth, through which abzug, abstrich, litharge and smoke all escape. From 6,000 to 7,000 pounds of lead are first charged, and more is gradually added until about 21,000 pounds (or the entire make for the year) has been melted. The blast is slow, and the litharge consequently flows rather cold. Refining follows the brightening of the silver, and metal of 985 to 995 fineness is produced. Usually the loss of lead falls between 5 and 6 per cent., while that of silver and gold seldom reaches 0.10 per cent. About 3 tons are cupelled in 24 hours, and the labor is 0.24 days per ton. Loss of lead 4 to 6 per cent.

TABLES OF THE OPERATIONS

The following tables will give at a glance all the foregoing particulars. The first two operations are combined in one table:

TABLE OF THE 1ST AND 2ND FUSIONS, 1866.

Charge.	*Weight Tons.*	*Ounces of Gold.*	*Ounces of Silver.*	*p. c. of Copper.*
Ore	81·15	21·0694	1333·4058	
Matte and Rich Scraps	89·61	19·2918	2216·6406	
Flux { 7.41 Basic / Siliceous 50.88	58·29			
Total	229·05	40·3012	3550·0464	
Products.				
First Matte	61·38	18·7193	1612·7324	5
Second Matte	30·87	20·4769	1806·7302	10
Scraps	10·25	·6824	95·0922	
Total		39·8776	3514·5548	

Labor 39 twelve hour shifts; 5 men to each shift = 195 days.

Charcoal for warming furnace, 291 bushels.
" for smelting, 6,820 "
7,111 "

(6) Charcoal per ton of ore.....65.2 bushels.
(6) Labor per ton of ore.....1.8 days.

TABLE OF THIRD FUSION, 1866.

Charge.		Tons.	Lead. Pounds.	Copper. Per ct.	Gold. Troy ounces.	Silver. Troy ounces.
Containing Gold and Silver	Rich quartzose ore	1·96			0·9610	59·5404
	Roasted 2d Matte	30·87		10	20·4769	1806·7202
	Scraps	2·09			·1474	23 0778
Containing Lead.	Lead Matte	3·71	741	6	1·9440	175 9600
	Litharge	10·81	17,722			66·1500
	Hearth	3 30	3,304			42·4700
Flux.	Scoria from 1st Fusion	10·99				
	Quartz	2·04				
		66·77			23·5193	2175 9184
Products.						
Lead		10·51	21,030		21·5442	1283·8320
Third Matte		15 59				624 5200
Lead Matte		3·70	741	20	1·9440	174 9600
Scraps & Flue Dust		4 06		10	0·2430	46 9900
					23·7312	2130 2920

Labor 10 twelve hour shifts; 5 men in each—50 days.

Charcoal for warming the furnace	100 bushels.
" " smelting	1710 "
	1810 "

(6) In calculating this it is to be remembered that 89—61=28 tons of matte from the previous year was smelted; this is counted as ore, which therefore amounts to 109 tons.

Labor per ton of ore	0·46 days.
Charcoal "	16·6 bushels.
Lead charged "	218 pounds.

TABLE OF CUPELLATION.

Charged.	*Tons.*	*Lead p.c.*	*Gold. Troy ounces.*	*Silver. Troy Ounces.*
Lead	10.06	100	21·5442	1283·8320
Products.				
Fine Silver	1208·5 oz.		21·5294	1186·9560
Litharge	10 tons	82		64·9080
Hearth	53·2	50		31·9860
Loss			0·0144	
Gain				0·1800

Labor, 26 days=per ton of ore	0.24 days.
Wood, 7·52 cords, "	0.69 cords.
Charcoal, 40·00 bushels=per ton of ore	0·37 bushels.

TABLE OF COST PER TON OF ORE IN UNITS OF LABOR AND MATERIAL.

	Labor. Days.	Charcoal. Bushels.	Wood. Cords.	Lead. Pds.
First and Second Fusions	1·8	65·2	—	—
Third Fusion	0·46	16·6	—	8·0
Cupellation	0·24	0·37	0·69	9·7
Total	2·50	82·17	0·59	17·7

To this must be added a small quantity of wood or refuse charcoal, used in roasting the matte.

Some discrepancies will be noticed between the expense of charcoal as given in these tables and that allotted to each operation in the text. This arises from the fact that the latter is calculated upon the proportions of flux and ore, while the tables are calculated upon the ore alone. They are also more complete; including fuel for blowing in, blowing out, and any extra supplies needed in particular states of the furnace. The quantity of charcoal has been calculated on the heaped bushel of 2,748 cubic inches. The above cost is for ores of the richness before given. With richer ores there is more matte to heat and lead lost, and the cost is therefore somewhat greater per ton; but it is proportionately less per pound of gold and silver. The following table gives the relative cost for various ores; the cost of the poorest being taken as unity:—

Auriferous Silver in 200 Lbs.	*Value in American Coin.*	*Proportionate Cost; lowest taken as Unity.*
0— 14·5 oz.	$ 0—$ 61	1
14·5— 29·0	$ 61—$122	1·10
29·0— 58·0	$122—$244	1·31
58·0—116.0	$244—$488	1·73

The Lend ore falls under the first kind; the milling ore of Colorado is worth from $20 to $30 a ton, and therefore is also in the lowest section; the "smelting ore," so called, would be mostly in the 2nd and 3d ranks.

Losses.—By reference to the above tables it will be found that the following is the loss and gain of the year.

	1st and 2d Fusion. oz.	p.c.	3d Fusion. oz.	p.c.	Cupellation. oz.	p.c.
Gold—Loss	4·24	1·0			0·15	0·07
Gain			2·02	0·86		
Silver—Loss	35·50	1·0	45·63	2·1		
Gain					0·02	0·0015

Total Loss—Gold 2·37 oz=0·21 p.c. Silver 81 11 oz. 3·1 p.c.

These amounts are, however, so small that it is impossible to say whether the assayers' errors do not amount to more than the reported loss and gain. It is, indeed, doubtful if ores can be handled with so little loss. Dr. Turner's opinion, founded upon years of experience, is that more than 90 per cent. of the silver and 96 per cent. of the gold can be counted upon. Some years ago he undertook to ascertain the loss incurred in amalgamating and found it to be 45 per cent. He therefore placed no reliance upon his results, but when we consider the poverty of the milling ore, we shall see that a loss of one half the gold contained in it would affect but very little the grand result.

The cost of all the operations in 1866, at Lend, was $883.88, and the balance sheet shows a profit of $1,355. The expense was proportioned as follows: Labor 17, materials 43, direction 40; total 100.

THE COAL TRADE.

NEW YORK, July 19, 1872.

Though there is no change in prices, the market is, if anything weaker than last week. The smaller sizes show activity in comparison with Steamboat, for which the demand has not been very good. Scranton holds on the even tenor of its way, but Schuylkill coals are less firm, and there is talk of some of those extra efforts to dispose of stock which are pretty sure to mark a depression of prices, so decided and so long continued as that which the trade at present. Shipments of Scranton have been less than for the same time last year, as might be expected, from the different conditions of the market, and the fact that then the miners were fresh from a long strike. This difference is likely to keep up, and may even in time have some corrective influence upon prices. But no immediate change of is looked for. In view of the low prices, calculations are occasionally entered into, for the purpose of showing how cheaply coal can be mined and carried, and some remarkable figures are produced. If they had any reality, or applied to coal mining generally, the trade ought not to look upon its present condition with uneasiness. But unfortunately the companies' books do not foot up the same totals, and as a matter of fact there is considerable pressure on those producers who do not hold particularly long purses. One suspension is reported, but we are happy to say, that it promises to be but temporary.

Though the market this week proves that even the previous depression only covered a depth a little more profound, there is still hopeful feeling in the trade. Manufacturing industries promises to be very flourishing, the iron business is destined to have about as great an expansion as it is capable of, and it is hoped and expected that those leading consumers of coal will, before long step in to steady and sustain the market. In England the prospect of a busy season in the iron trade has, of itself been enough to put coal up very seriously. Our iron business, great as it is, does not have importance enough to influence coal prices so decidedly, at least in the face of a depressed market, but if other manufacturing increases in a similar way, the demand for coal will be considerably increased. Before that day is reached, however, the accumulation of stock now going on will have to be disposed of.

The *Miner's Journal* of Pottsville, July 13, reports that "the committees of the Anthracite Board of Trade and the W. B. A. report the average price of coal for last month at $1 99 per ton. . . . Coal has fallen below $2 00 per ton here. The supply for the week is about 135,000 tons behind the weekly average of last year, for the balance of the season, which was 490,000 tons a week. The coal market will be dull this and the ensuing months, as so many people are absent from the cities and the market is so fully supplied with the present shipments. After August there may be a slight change for the better, as the stocks of the shipping ports are declining a little."

"As you were" is still the order in the bituminous trade. Business is fair and prices are steady, though Franklin coal has been offered at $6 50 in quantity. By the completion of a branch road to Corrigans on the Cumberland and Pennsylvania railroad, by the Consolidated Company of Maryland, George's creek coal has a direct, all rail route to the Pennsylvania fields. Iron properties lying in the neighborhood of this line, are, we believe, in the market, and should any extensive operations be gone into, the Consolidated Company will be immediately benefitted. Independently of this, the completion of the road, which is expected within ten days, cannot fail to have its influence upon Maryland coals.

Bituminous Coal Trade, 1871 and 1872.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending July 13, 1872, compared with week ending July 15, 1871.

COMPANIES	1871		1872	
	Week.	Year.	Week.	Year.
C. & O. Canal	13 254	349,263	19,448	394,851
B. & O. R. R.	24,972	654,026	28,103	652,566
H. & B. T. R. R.	6,205	19,270	6,805	159,094
*Harrisburg & D.	11,193	322,449	6,591	288,866
*L. V. R. R.	....	41,737	674	16,542
P. & N.Y.C. & R. Co.	5,677	160 785	7,884	201,049
Cumberl'd Branch Canal	2,679	97 033	6,232	98,495
" Railroad	1 965	41,492	453	9,739
Total	66,293	1,858 006	76,229	1,734,183
		1,734,183	66,293	
Decrease		123 843	....	
Increase		....	9,936	

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending July 13, 1872.

	1872.		1871.	
	WEEK.	YEAR.	WEEK	YEAR.
By Railway	23,985 03	613 671 05	27,343 14	194,060 10
" Canal	281 04	2 392 07	976 14	3,035 01
Total	24,323 04	616,063 12	28,321 08	197,096 13
Increase, 1872	19,024 19			

Anthracite Coal Trade for 1871 and 1872.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending July 13, 1872, compared with the week ending July 15, 1871.

COMPANIES.	1871.		1872.	
	WEEK.	TOTAL.	WEEK.	TOTAL.
*Phila & Reading R. R†	153,691	2 3?9 677	127.687	2,910,111
Schuylkill Canal	34,617	375,9 7	27,363	399 883
*Lehigh Valley R. R.	72,164	812,544	67,348	1,845,429
Lehigh & Sus. R. R.	36,270	611 367	33,147	486,511
Lehigh Canal	31,613	158,145	29, 95	311,517
Scranton North	17,595	132 574	16,216	155 355
" South	47,329	328,374	38,213	1,140,625
Penn. Coal Co., rail	27,246	1?3,51	23,085	613,674
" " " canal	976	3,365	238	2,392
Del. & Hud. Canal Co.	35,631	282,272	42,952	591,730
" East	11,344	121,760	11,322	346,584
" " West	4,811	32,481	10,983	193,862
" " South	16,237	104 895	8,310	192,975
Shamokin	12,024	329,513	12,674	210,004
Treverton	....	....	....	....
Lykens Valley Coal Co.	....	42,591	..	2,580
Wyoming North	....	....	....	....
Wyoming South	....	....	....	....
P. N. Y. C. & R. R. Co.	....	84,776	14,195	341,657
Williamstown Co'y	....	....	....	....
Big Lick Col	....	63,461	....	10,591
Total	502.166	5.947,372	474 458	10 419,479
1870	454,458			5,947,372
Decrease	47,708			7 ,10
Increase				

* These figures are for the week and fiscal period commencing Nov. 30

† Less coal transported for Co's use and Bituminous coal.

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending July 13, 1872, with totals to date, compared with same time last year.

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL Tons. Cwt.
Total Wyoming	10.739 02	319,979 06
" Hazleton	51,7.6 02	1,297,150 01
" Upper Lehigh	43 18	1,487 18
" Beaver Meadow	16,721 19	443,565 17
" Mahanoy	8,281 12	226,524 09
" Mauch Chunk	22 12	2,000 06
Total	87,526 06	2,290,707 17
Same time last year	94,915 09	956.160 03
Increase		1,334,547 14
Decrease	7,389 03	
Forwarded East from Mauch Chunk by rail	67,347 16	1,845,428 16
Same time last year	74,163 17	812,544 09
Increase		1,032,881 07
Decrease	4, 16 01	
DISTRIBUTED AS FOLLOWS.		
Forwarded East from Mauch Chunk by rail	66,476 19	1,815,449 01
To East for use L. V. R. R.	870 17	29,979 15
Delivered at and above Mauch Chunk for use of L. V. R. R.	674 01	35,680 14
To P. & N. Y. C. R. R.	9,057 01	211,170 10
to N. C. R. R., at Mount Carmel		1,657 02
To D. H & W. R. R.	364 10	15 817 18
To L. & S. R. R. at Packerton for rail	513 09	8,015 19
Delivered at M'h Chunk	152 05	1,123 06
Delivered on line of road above Mauch Chunk	15 11	
To L. & S. R. R., at Penn Hav., for railroad	170 00	10 856 16
Do for canal	6,924 07	3,950 07
To Lehigh Canal Mauch Chunk	2 046 15	97,559 18
To Catawissa Railroad	230 10	53,822 04
		5,594 18
Total	87,526 05	2,290,707 17

Report of Coal Transported over Central R.R. of N. J. (Lehigh and Susq. Div.)

Week ending July 13—Compared with same time last year.

WHERE SHIPPED FROM	WEEK 1872., tons ct	WEEK 187 . tons ct.	YEAR 1872 tons cwt.	YEAR 1871. tons cwt.
Wyoming Region	30346 18	37'48 17	7?93 9 11	512300 17
Upper Lehigh Region	3692 11	3734 06	103989 14	14483 06
Beaver Meadow Region				
Hazleton Region	6986 00	9933 18	163130 08	20563 08
Mahanoy Region				
Frescokow Region	4158 02	3227 00	69638 04	8425 19
Mauch Chunk Region	8172 15	6484 00	226195 09	74369 14
Totals	53646 06	60928 06	12?20.0 06	661233 04
Increase			570767 02	
Decrease	7281 15			
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	33177 07	36259 15	883511 10	511367 03
Forwarded East of Mch Chunk by Canal	14354 08	19467 08	193716 13	77643 13
Delivered at and above Mauch Chunk	1912 03	1041 01	30193 03	29185 09
	145 14	490 01	8.92 18	19783 06
L. V. R. R at Packer'n				
Delivered to L. & B. R. R.at PlymouthBridge	4956 14	2659 16	113461 02	22953 13
Totals				
Of the above there was transported on acc'nt of L. C. & N. Co	13460 04	9759 18	3?9698 00	98125 01
W.-B. C. & L. Co.	19156 08	25.61 04	5197.9 16	41102 02
Totals	33116 12	35121 02	824?7 16	5094? 02
Increase			311.99 14	
Decrease	2004 10			

Delaware and Hudson Canal Company.

The following is a statement of Coal Transported by the Delaware and Hudson Canal Co. for the week ending July 13, 1872.

	FOR THE WEEK.	FOR THE SEASON.
By Delaware and Hudson Canal,	42 952	591.730
By Railroad, East	11,322	346,544
" " West	10,8 3	193 862
" " South	8,310	192,975
Total Tons	73.467	1,325,151

For the same period last year.

	FOR THE WEEK.	FOR THE SEASON.
By Delaware and Hudson Canal,	31,6 1	282,272
By Railroad, East,	11,344	121,760
" " West	4,811	32,481
" " South	16,217	104,895
Total Tons	61,028	841,404

Penn. and N. Y. R. R.—Coxton, Pa.

Coal tonnage for week ending July 13, 1872.

	Week. Tons. Cwt.	Total. Tons. Cwt.
Anthracite received:		
From Lehigh Valley R. R.	9,057 01	211,170 10
" Lack. & B. R. R.	1,531 19	47 3?0 06
" Pleasant Valley R. R.	2 693 15	55,481 07
" Sul. & Erie R. R.	912 04	30,704 10
Total	14,194 19	344,656 13
Distributed:		
To Lehigh Valley R. R.	953 08	26,439 11
To Lack. & B. R. R.	....	1 0.7 17
To S. Central R. R	2,298 04	62,781 10
To Ithaca & A. R. R.	1,777 11	68 221 02
To Erie R. W. Pockets for shipm't.	8 113 17	141,913 12
To individuals on line of road	458 02	13,?87 18
To points at & above Coxton for use of Co	473 05	14,531 01
To points between Waverley and Elmira	120 12	22,264 02
Total	14.194 19	344 656 13
Bituminous received from BARCLAY R. R.		
Shipped north from Towanda	7,788 03	204,043 05
Shipped south from Towanda	....	1,?35 04
Northern Central R R.	....	113 01
Total	7,788 03	205 417 10
Distributed:		
To Erie Railway	7,464 07	182,841 03
To So Central R R	3?3 16	21,016 07
To Ithaca Valley R. R.	....	21 15
Lehigh Valley, R. R.	....	237 10
To individuals on line of Railroad	....	?58 00
To points on line of road for use of Company	....	202 15
Total	7,788 03	205,417 10
Grand totals transported:		
Anthracite	14,194 19	344,656 13
Bituminous	7,788 03	205,417 10
Total	21 983 02	550,074 03

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, July 13, 1872.

BY RAILROAD—ANTHRACITE.

PASSING OVER MAIN LINE AND LEB. VAL. BRANCH.

	Tons. Cwt.
From St. Clair	34,056 01
" Port Carbon	6,109 05
" Pottsville	2,616 17
" Schuylkill Haven	24,134 05
" Pine Grove	5,770 17
" Tamaqua	11,246 16
" Harrisburg	.....
" Dauphin	5,439 06
Total	88,363 17

FOR SHIPMENT BY CANAL.

Passing Frackville Scales	10,870 19
" Mill Creek "	2,567 06
" Schuylkill Valley Scales	779 14
" Mt. Carbon "	1,034 10
" Cressona "	9,471 11
" Pine Grove "	.....
" Tamaqua "	2,014 14
Total	16,698 12

SHIPPED WESTWARD VIA NORTHERN CENTRAL RAILROAD.

Passing Locust Gap	2 245 03
" Shamokin	4,155 10
" Herndon	.....
Total	6,400 13

SHIPPED WEST OR SOUTH FROM PINE GROVE.

Via Schuylkill & Susquehanna R. R.	1,?35 13
" Lebanon & Pine Grove Branch	1 014 10
Total	2,749 ?3

CONSUMED ON LATERALS.

From Frackville Scales	559 18
" Mill Creek "	710 04
" Schuylkill Valley Scales	557 00
" Mt. Carbon "	883 09
" Cressona "	168 18
" Pine Grove "	4 09
" Tamaqua "	247 12
Total	2,851 05

LEHIGH AND WYOMING COAL.

Received via Allentown, E. Penn'a br.	98 13
" " Alburtis, " "	.....
" " Oreland, G. & N. Br.	612 08
" " Connecting R. R.	.....
" " Willow Street R. R.	412 12
Total	1,123 13

BITUMINOUS.

From Harrisburg	6,580 15
" Connecting R. R., G. & N. Br.	.....
" Junction R. R.	10 00
Total	6,590 15

COAL FOR COMPANY'S USE.

Anthracite	5,102 05
Bituminous	80 06
Total	5,182 12

RECAPITULATION.

	Total for Week.	Corresp'g week last year.	Increase and Decrease.
Passing over Main Line and Leh. Val Branch	88,353 07	113 0?? 00	d 24,631 13
For Shipment by Canal	26,698 12	34,676 02	d 7,977 10
Shipped Westward via Northern Central R. R.	6,400 13	5,027 01	i 1,373 10
Shipped West or South from Pine Grove	2,219 01	2,338 11	d 79 08
Consumed on Laterals	2,851 05	2,?96 13	i 454 07
Lehigh and Wyoming Coal	1,123 13	2,272 13	d 1 149 00
Total Anthracite paying freight	127,696 13	159,691 07	d 31,994 14
Bituminous	6,590 15	11,191 09	d 4,?00 14
Total of all kinds paying freight	134 277 03	170,881 16	d 35 6?4 ?8
Coal for Company's use	5,182 12	3,241 13	i 2,157 19
Total Tonnage for Week	139,459 20	174,125 09	d 34,466 09
Previously this year	3241143 01	2?9901 09	i 574,811 15
Total to date	3381 03 01	2323727 18	i 540,3?5 06

SHIPPED BY CANAL.

From Schuylkill Haven	25 277 13	31,967 19	d 8,0?0 03
" Port Clinton	2 023 09	2,451 09	d 995 09
Total Tonnage per Week	27,301 10	34 418 10	d 8,1?? 00
Previously this year	5?2,3?9 19	833,?20 10	i 19, 9? ?9
Total to date	599?3 ?9	868,138 09	i 10,?44 ?9

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, July 13, 1872.

	WEEK.	SEASON.
North	49,250 12	1,361,725 10
South	8,310 08	192,974 14
Total 1872	57,561 00	1,554,700 04
Corresponding time in 1871:		
North	37,226 01	396,873 06
South	10,237 10	104,894 13
Total	67,463 11	501,767 19
Increase North		
Decrease North		
Increase South		
Decrease South		
Total decrease 1872	9,902 11	
Total increase 1872		1,052,932 05

Delaware Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna, & Western Railroad for the week ending Saturday, July 13, 1872.

	WEEK. Tons. Cwt.	YEAR. Tons. Cwt.
Shipped North	16,215 14	355,354 18
Shipped South	38,212 19	1,140,624 15
Total	54,428 13	1,495,979 13
For the Corresponding time last Year:		
Shipped North	17,595 08	132,573 18
Shipped South	47,320 08	328,374 01
Total	64,915 16	460,947 19
Increase		1,035,031 15
Decrease	10,487 03	

Lehigh Canal Coal Trade.

Shipped for the week ending July 12, 1872.

	Week. Tons. Cwt.	Week. Tons. Cwt.
Total from Mauch Chunk Region	8,244 19	107,128 05
" " Beaver Meadow "	3,401 14	67,565 12
" " Mahanoy "	293 10	5,270 13
" " Hazleton "	6,924 07	97,093 11
" " Upper Lehigh "	773 13	13,420 14
" " Wyoming "	1,157 06	21,038 04
Total	20,795 09	311,516 19
Corresponding week last year	31,643 05	158,142 18
Increase		153,374 01
Decrease	10,843 16	

Lehigh Coal and Navigation Company,

Report of Coal transported over the Lehigh Canal and L. & S. Div of Central Railroad of New Jersey for the week ending July 13, 1872, and for the year 1872.

		WEEK.	YEAR.
Forwarded East of M'ch Chunk by Rail		33,177 07	886,511 10
Delivered at and above	do.,	1,012 03	30,198 09
Forwarded East of	do., by Canal	20,795 09	311,516 13
		54,984 19	1,228,226 12
Corresponding period last year—			
Forwarded East of M. Chunk by Rail		36 269 15	511,367 03
Delivered at and above	do.,	1,041 01	29,485 09
Forwarded East of	do., by Canal	31,643 05	158,142 18
		68,954 10	698,995 10
Increase on Railroad			375,8o7 01
Decrease " "		3,121 06	
Increase on Canal			153,374 01
Decrease " "		10,843 16	
Of the above there was transported on account of—			
Lemgh Coal Nav. Co		21,905 03	416,826 05
Wilkesbarre Coal & Iron Co		19,456 08	510,729 16
		41,361 11	927,556 01
Corresponding period last year—			
Lehigh Coal & Nav. Co		20,098 13	190,463 04
Wilkesbarre Coal & Iron Co		25,361 04	411,002 02
		45,459 17	591,465 06
Increase			336,090 15
Decrease		4,098 06	

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Saturday, July 13, 1872.

	Tons. Cwt.
From Schuylkill Haven	25,277 10
" Port Clinton	2,086 00
Total for week	27,363 10
Previously this year	372,519 19
Total	399,883 09
To same time last year	375,907 10

Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the week ending Saturday July 13, and during the year 1872, compared with the corresponding period of 1871.

WEEK.

	To C. & O. Canal Tons. Cwt.	To B. & O. R. R. C. Tons. Cwt	Total. Tons Cwt.
1872	19,477 11	28,103 03	47,580 14
1871	13,254 10	24,922 09	38,176 19
Increase	6,223 01	3,180 14	9,403 15
Decrease			

YEAR.

1872	304,861 16	652,566 01	957,427 17
1871	340,263 03	659,025 12	999,288 15
Increase			
Decrease	35,401 07	6,459 11	41,860 18

Cumberland Branch R. R.

WEEK.

	To C. & O. Canal. Tons. Cwt.	To B. & O. R. R. Co. Tons Cwt.	Total. Tons. Cwt.
1872	6 251 11	468 03	6,719 14
1871	3,679 00	1,965 15	5,644 15
Increase	2,572 11		1,074 19
Decrease		1,497 12	

YEAR.

1872	98,496 04	9,738 16	108,235 00
1871	97,032 16	41,492 07	138,525 03
Increase	1,463 08		
Decrease		31,753 11	30,290 03

Shamokin Coal Trade.

For week ending July 13, 1872	12,674 08
Same time last year	12,622 05
Increase	52 03
Decrease	
Total amount shipped to date	271,004 07
Same time last year	329,513 02
Increase	
Decrease	58,509 15

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW YORK, July 19. R. A.	W. A.	AT PHILADELPHIA. July 19. R. A.	W. A.
SCHUYLKILL.				
Lump	$— —	$— —	— —	— —
Steamer	— —	— —	— —	— —
Broken	— —	— —	— —	— —
Egg	5 25	4 75	— —	— —
Stove	5 50	5 00	— —	— —
Chestnut	4 25	—	— —	— —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	5 35	—	— —	— —
Broken	4 60	— —	— —	— —
Egg	4 60	— —	— —	— —
Stove	4 85	— —	— —	— —
Chestnut	4 35	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS				
Honey Brook, Le'h W. A.	4 00@5 00		— —	— —
Spring Mountain " "	— —@— —		— —	— —
Sugar Creek " "	— —@— —		— —	— —
Sugar Loaf " "	— —@— —		— —	— —
Old Compy's " "	4 00@5 15		— —	— —
Room Run " "	4 00@4 50		— —	— —
McNeal " "	— —		— —	— —
Girardville " "	— —		— —	— —
Hill & Harris " "	— —		3 10@4 00	— —
Shamokin " "	— —		— —	— —
Lykens Valley " "	— —		— —	— —
Broad Top " "	— —		— —	— —
McMichael " "	— —		3 25@4 25	— —
Henry Clay " "	— —		— —	— —
Powelton "	— —		— —	— —

Company Coals.

July, 1872.

	L.	Str.	Gra	Eg.	Sto	Chest
*Scranton at E. Port	3 60	3 85	3 75	3 85	4 25	3 80
*Pittston at Newburg	3 50	3 50	3 50	3 50	3 70	3 50
*Lackawana at Weehawken	3 50	3 50	3 50	3 70	4 00	3 60
Wilk'b're at Hoboken	3 75	3 75	3 85	3 85	4 25	3 80
Old Co. Lehigh at Pt John'n	5 25	—	4 50	4 50	4 60	4 00
Lehigh at Kliz. Port	5 00	—	4 25	4 25	4 50	4 00

For freights to different points see "Freights."
To contractors only.

Prices at Baltimore—July, 1872.

Wholesale Prices to Trade

Wilksbarre, by cargo or car load	$4 60@4 85
Pittston and Plymouth, do	4 60
Shamokin Red or White Ash, do	4 75
Lykens Valley Red Ash, do	5 50
Zerba Valley	
Treverton	
By retail, all kinds per ton of 2,240 lbs	6 50@7 50
George's Creek and Cumberland f. o. b. at Locust Point for cargoes	4 60@4 65
Fairmont and Clarksburg gas f. o. b. at L. Point	6 00
BITUMINOUS COALS.	
Kittaning Coal Co.'s Phœnix Vein, f. o. b. at Phila	$
Lemon " " "	
Cumberland Vein Coal	
Consolidation Coal Co.'s on board N. Y.	
Maryland Coal Co " "	

Prices at Georgetown, D.C., and Alexandria, Va.

July, 1872.

George's Creek and Cumberland f. o. b. for shipping $4 75

Prices at Havre de Grace, Md.

July, 1872.

Wilkesbarre and other White Ash for Cargoes	$4 25@4 50
Lykens Valley	@5 50
Shamokin Red or White Ash	4 25@4 50

Bituminous Coals (Cumberland).

Georgetown, F.o.b.	$4.25
Baltimore	4.50
New York	6.60

Prices of Gas Coals.

July, 1872.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N. Y

	Coarse	Slack.
Block House	$1 60	$— 75
Gowrie	1 60	— 75

Vessels are being chartered at $3 00 to $3 25.

Corrected by Bird, Perkins & Job, 27 South street.

	Coarse.	Culm of Coal,
Picton	$2 25	1 25
Sydney	2 25	- 80
Lingan	1 60	- 80
Caledonia	1 60	- 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty on all slack coal or Culm: 40c. per ton of 28 bushels, 80 pounds to the bushel. On all bituminous coal or shale: 75 cents per ton of 28 bushels.

AMERICAN.

	Currency.
Westmoreland	$7 10 @— —
Fairmount Gas Coal Co. of N. Y.	7 00 @— —
Despard Coal Co.	7 00 @— —
Penn	7 10 @— —
Newburg Orrel Gas	— — @— —
West Fairmount Gas Coal	7 00 @— —
AT PHILADELPHIA.	
Westmoreland	6 00 @— —

Prices of Foreign Coals.

July, 1872.

Duty 75 c. per ton.

Corrected weekly by ALFRED PARMELE, No. 32 Pine street, N. Y.

Liverpool Gas Caking	$ 8 00@— —
" " Cannel	12 00@13 00
" House "	19 00@20 00
" Orrel	14 00@16 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$14 00@16 00
"Cannel, "	19 00@23 00

Per ton 2,000 lbs. delivered.

Foreign and Provincial Freights.

July 1872.

Foreign.

Newcastle and Ports on Tyne, per keel of 21 1-5 tons £
Liverpool, 5 per cent primage

TO NEW YORK.

Provincial.

Sydney	$3 05
Lingan	3 15
Cow Bay	3 52
Port Caledonia	3 10
Little Glace Bay	3 00

TO BOSTON,

Sydney	3 05
Lingan	3 00
Cow Bay	3 00
Port Caledonia	3 00
Little Glace Bay	2 90

Freights.—July 18, 1872.

TO EASTERN PORTS.	Cumberland. From Georgetown.	Cumberland. From Baltimore.	Anthracite. From Philadel'a.	Anthracite. From Elizabethport, Port Johnston, and Hoboken.	Anthracite. From Newburgh.	Anthracite. From Rondout.
Amesbury						
Bangor				2 00		
Bath	2 85	2 90				
Boston	2 75	2 75		2 00	2 35	2 45
Bridgeport	2 30	2 40		1 00	1 20	1 25
Bristol	2 40			1 60		
Cohasset Nar'ows	2 75					
Derby				1 25		
Dighton	2 50					
East Cambridge				2 00	2 35	
Fall River	2 40	2 40		1 55	1 75	1 85
Hackensack						
Hartford	2 85	3 00		1 55		
Hoboken	2 00			55		
Jersey City	2 00			55		
Middletown				1 35		
Mystic						
New Bedford	2 50	2 75		1 60		
Newburyport	2 90	3 00		2 20		
New Haven	2 30	2 30		1 00	1 20	1 25
New London	2 40	2 50		1 30	1 45	1 55
Newport	2 40			1 55	1 75	1 89
New York	2 15	1 90		55	60	65
Norwalk	2 40	2 50		1 00	1 20	1 25
Norwich	2 50	2 50		1 40	1 55	1 60
Pawtucket	2 60	2 90		1 60		
Portland	2 75	2 75		1 90		
Portsmouth, N.H	2 90	2 90		2 25		
Providence	2 40	2 40		1 55	1 75	1 85
Rockport						
Saco				1 30		
Sag Harbor				2 10		
Salem	2 80	2 90		1 00	1 20	1 25
Stamford				1 30		
Stonington				2 05		
Taunton				1 55		
Warren						
Washington						
TO RIVER PORTS.						
Albany	3 00	2 50			55	
Catskill					50	
Cockzackie					50	
Coeyman's					65	
Cold Spring	2 30	2 25			20	
Fishkill					20	
Haverstraw	2 0				40	
Hudson	2 0	2 30			40	
New York						
Nyack	2 25				45	
Poughkeepsie	2 50				30	
Rhinebeck					30	
Rondout					30	
Saugerties					40	
Sing Sing					50	
Stuyvesant					55	
Tarrytown					50	
Troy	3 00	2 50			75	
West Point					20	
Yonkers					50	

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven for consumption ($1 85 less 55c drawback	$1 30
For reshipment	1 75

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Phillipsburgh	$0 66
C. R. R., N. J., Phillipsburgh to Elizabethport	0 98
Shipping expenses at Elizabethport	25
Wharfage	10
Total	$1 99

MAUCH CHUNK TO PORT JOHNSON.

L. V. R.R., or L. & S. R.R. from M. C. to Phillipsb'g	$0 66
C. R. R., of N. J., Phillipsburgh to Pt. Johnson	0 98
Shipping expenses	25
Wharfage	10
Total	$1 99

TO HOBOKEN

L. V. R. R., Mauch Chunk to Phillipsburgh	66
Morris & Essex R. R. Phillipsburgh to Hoboken,	0 98
Shipping expenses	25
Wharfage	10
Total	$1 99

TO SOUTH AMBOY.

L. V. R. R.	66
B. & D. R. R.	98
Cam. & Am. R. R.	
Shipping Expenses	35
Total	$ 199

PENN HAVEN TO ELIZABETHPORT.

L. V. R R. Penn Haven to Phillipsburgh	0 7
C. RR. of N. J. Phillipsburgh to Elizabethport	0 98
Shipping expenses	25
Wharfage	10
Total	$2 11

MARKET REVIEW.

IRON.—The market for Scotch Pig is quiet, but importers are very firm in their views, owing to the recent advances on the other side, and the belief that prices must shortly take an upward turn. Several arrivals of Garlsherrie have gone into store, as the cost and charges on the importations cannot now be obtained. We quote the ranges of No. 1 brands $48a55, here and to arrive. We notice sales of 425 tons Glengarnock at $50, and from 800 to 1000 tons sundry inferior brands on terms we did not learn. No. 1 American is very firm at $52a53—the hot weather causes a decrease in the production, and very little is now being made; No. 2 is more plenty, but without sales of moment. We quote No. 2 $50, and Gray Forge nominally $48. English Rails are quiet and nominal

at $72a73 gold, for new, but sales have been made at less than these figures, Some 2000 tons have changed hands, but the terms we could not learn. In old we notice sales of 100 tons T at $48,50, and 700 do. English and American $49, both gold; and 500 do., delivered at Philadelphia in 30 days, on private terms. We quote new American $84a87,50 currency, and old do. $58,50a49 gold, with sales of 100 tons at $48,50. Scrap is without change and nominal. 1,700 tons Wrought, on the spot and to arrive, sold on terms not made public, Refined Bar from store continues unchanged, though there will no doubt be an advance in a few days, as the price is far below the cost of importation.

PHILADELPHIA, July 15.—(From Circular of Edward Samuel.)—In Pig, sales are reported of 500 tons Lehigh No. 2, close at $50 delivered here, and parcels of No. 1 and 2 at $53 and 52 here. The market, however, is dull in most every grade. Merchant Bars are again quite active, under a reported advance to 4.8 cents per lb., and in consequence of the rise in English Bars, and parties here talk of even higher figures. Closing prices of No. 1 Foundry Pig at furnace $50a51, No. 2 $48a49, No. 3 Forge $46a48, and No. 4 White and Mottled $42a44.

COPPER.—Manufactured is steady at former prices, say 43 cents for Sheathing and 45 for Braziers and Bolts; Bronze and Yellow Metal Sheathing 30, and Yellow Metal Bolts 32, net cash. The market for Ingot is almost at a stand, and prices are again a little lower; the offerings, however, are very moderate at the rates now ruling; we have but to notice sales of 50,000 lbs. Lake at 33a33¼ cents; 34 cents is asked for forward delivery. In Old Copper, some 5a6000lbs. sold at 26a27 cents.

LEAD.—There is no business in Pig, and prices are nominally as before, say 6¾ cents gold for ordinary Foreign. Bar 9¼ cents, Sheet and Pipe 11, and Tin-lined Pipe 15, usual discount to the Trade.

SPELTER—Remains dull, buyers holding off for the reduction of duty, 1st prox. Silesian may be quoted nominally 7a7¼ cents gold.

STEEL—The market is without change, but firm at our quotations—Cast continues in small stock.

TIN—The demand for Pig for immediate delivery is light, buyers waiting the abolition of the duty. 300 slabs Straits sold at 36 cents, and 600 do. Straits and Bullion for August delivery 34¼, now held at 34½a34¾ cents for August; for immediate delivery the asking prices are for Straits and English 36a36¼ and for Banca 48—all the above figures gold. In plates there is an improved feeling, and prices are firmer; the latest Liverpool quotations are 48s. for Charcoal Tin, and 42s. for Coke. Sales have been made of 250 bxs. Charcoal Terne, for immediate delivery, at $21,50 gold; and for August delivery, 1000 bxs. Coke Tin 14 by 20, $12 gold; and 400 do. Coke Terne, and 300 do. Coke Tin, on private terms.

ZINC—Is quiet at our figures, American dry 8a9 French 9½a10, Metallic 10½, Manganese 4½.

METALS.

NEW YORK, July 18, 1872.

IRON.—Duty: Bars, 1 to 1¼ cents ₩ lb; Railroad, 70 cents ₩ 100 lbs.; Boiler and Plate, 1¼ cents ₩ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ₩ lb; Pig, $7 ₩ ton; Polished Sheet, 3 cts. ₩ lb; Galvanized 2½; Scrap Cast, $6; Scrap Wrought, $8 per ton.

	Store Prices.
Pig, Scotch No. 1, ₩ ton	48 00@55 00
Pig, American, No. 1	52 00@53 00
Pig, American, No. 2	50 00@51 00
Pig, American, Forge	48 00@49 —
Bar Refined, English and American	— —@— —
Bar Swedes, assorted sizes	85 00@150 00
	Store Prices, Cash.
Bar, Swedes	125 00@135 —
Bar, Refined, ¾ to 2 in. rd. & sq. 1 to 6 in. x ⅜ to 1 in.	110 00@— —
Bar, Refined, 1¼ to 6 by ¼ & 5:16 & 2¼ to 2¾ rnd. sq..	115 00@— 00
Bar, Refined, 1 & 1¼ by ¼ & 5:16	117 50@— —
Large Rounds	122 50@127 50
Scroll	122 50@152 50
Ovals and half-round	127 50@137 50
Band	— —@122 50
Horse Shoe	120 00@130 00
Rods, ⅜ to 3-16 inch	112 00@155 00
Hoop	135 00@177 50
Nail rod	8 @— —
Sheet, Russia, as to assortment (gold)	— @ 18
Sheet, Singles, D. and T. Common	—6½@— 7½
Sheet, D. and T. Charcoal	—7¾@— 8½
Sheet, Galv'd, Nos. 10 to 27, list 10 per cent discount	—@— —
" " Nos. 28, and 29	—@— —
Rails, English (gold), ₩ ton	72 00@ 73 00
Rails, American, at Works in Pa	84 00@87 50

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 4 cents ₩ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ₩ lb	— @— 43
Copper Bolts	— @— 45
Copper Braziers, 16oz. and over	— @— 45
Copper Nails	— @— 45
Copper, Old Sheathing, &c. mixed lots	26 @— 28
Copper, Old, for chemical purposes, 14@16 oz	— @— —
Copper English Pig	— @— —
Copper, American Ingot	33 @— 33½
Yellow Metal, New Sheathing & Bronze	— @— 30
Yellow Metal Bolts	— @— 32
Yellow Metal Nails	30 @— 32

LEAD.—Duty: Pig, $2 ₩ 100 lbs.; old Lead, 1½ cents ₩ lb; Pipe and Sheet, 2½ cents ₩ lb.

Galena, ₩ 100 lbs	$— @— —
Spanish (gold)	— —@6 62½
German, do.	— —@6 62½
English do.	6 62½@7 12½
Bar (net)	9 25 @ —
Pipe (net)	— — @11 00
Sheet	— — @11 00

Colwell, Shaw & Willard Tin-Lined Lead Pipe 15 cts. ₩ lb.

STEEL.—Duty: Bars and ingots, valued at 7 cents ₩ lb or under, 2¼ cents; over 7 cents and not above 11, 3 cents ₩ lb; over 11 cents, 3½ cents ₩ lb, and 10 ₩ cent ad val. (Store prices.

English Cast (2d and 1st quality) ₩ lb	— 16½@— 19½
English Spring (2d and 1st quality)	— 9 @— 10½
English Blister (2d and 1st quality)	— 11½@— 16
English Machinery	— 11½@— 13½
English German (2d and 1st quality)	— 11½@— 12
American Blister "Black Diamond"	— @— 12
American, Cast, Tool do.	— 15 @— 16
American, Spring, do.	— 9 @— 11
American Machinery do.	— 10 @— 10½
American German, do.	— 9 @— 11

TIN.—Duty: Pig, Bars, and Blocks, 15 ₩ cent. ad val.; Plate and Sheets and Terne Plates, 25 ₩ cent.; Roofing 25. ad val.

	Gold ₩ lb.
Banca	48 @—
Straits	36 @36½
English	36 @36½

PLATES. Fair to Good Brands,	Gold.	Currency.
I. C. Charcoal, ₩ box	$13 25 @13 50	$15 00 @15 50
I.C. Coke	12 25 @12 50	13 75 @14 75
Coke Terne	10 25 @11 25	11 75 @12 75
Charcoal Terne	11 50 @12 00	13 50 @14 00

SPELTER—Duty: In Pigs, Bars & Plates, $1.50 p. 100 lb
Plates, Foreign (gold) p. 100 lb. 6 87½@ 7 12½
Plates, Domestic p lb. — 8 @— 11

ZINC—Duty: Pig or Block, $1.50 per 100 lb.; Sheet 2½c. per lb
Sheet per lb.— 10 —@ 10½

Mining Stocks.

NEW YORK, July 17, 1872.

The following is the report of this morning's session of the Mining Stock Board, but little change is noticeable compared with our report of the market two weeks ago. The transactions for the morning are comprised in a transfer of 500 shares of Grass Valley at 14c. also several transfers of La Crosse aggregating 2,100 shares at from 71 to 72c. per share. Walkill assent "Lead" is quoted at from 2 to 4c. per share.

	BID.	ASKED.
American Flag	25	40
Bates & Baxter	40	—
Benton	3	8
Black Hawk	40	75
Jasco Gold	—	—
Central Gold	6	9
Cons Gregory	—	50
Grass Valley	14	15
Gunnell	50	1 40
Holman	4	5
La Crosse	70	75
Liberty	2	4
Montana	—	72
New York and Eldorado	10	13
Quartz Hill	—	40
Rocky Mount	5	10
Smith & Parm	15	20
Texas	5	10
Nye	1	3
Hope	1	10

Petroleum.

Petroleum is dull and nominally unchanged; reference to our quotations for several weeks past exhibits the same condition of the petroleum list which we apply to the state of the market to-day. We append the report of the Board.

	BID.	ASKED.
Bennehoff Run	—	30
Bergen Coal and Oil	—	40
Bliven Oil	—	40
Blood Farm	5	—
Brewvoort	1 75	3 00
Buchanan Farm	40	50
Central	40	50
Clinton	—	—
Home	1 00	1 50
National	—	—
New York & Allegheny	1 25	—
Northern Light	30	—
Phillips Pet	5	15
Pithole Creek	—	1 00
Rathbone Oil	20	30
Rynd Farm	20	30
Second National	—	40
Sherman & B	—	—
Tarr Farm	—	—
United Petroleum Farms	20	—
United States	—	55
Webster	4	—

San Francisco Stock Market.

BY TELEGRAPH.

New York July 17th, 1872

The following report from the San Francisco Stock Board is dated the 16th inst. Without exception the market has advanced, we have appended the report of the 11th inst., showing the course of the market during the two days. A telegram dated the 16th inst., received since writing the above states that another heavy rise in mining stocks has taken place in the Washoe district, Cal., which has occasioned considerable excitement. Savage stock having advanced fully $100. per share, and that of the Comstock Mine, adjoining, from twenty-five to forty per cent. An important strike is reported among the miners in the Savage Mine, and it is stated that the workmen have been shut down in the mine to keep them from creating a disturbance among the miners in the adjoining claims.

	July 11.	July 16.
Savage	— 140	167
Crown Point	— 170	162
Yellow Jacket	— 130	140
Kentuck	— 295	320
Chollar Potosi	— 104	117
Gould & Curry	— 175	—
Belcher	— —	1075
Imperial	— 14½	14
Hale & Norcross	— —	—
Eureka G. V.	— —	—
Ophir	— —	—
Alpha	— —	—
Raymond & Ely	— —	—
Amador	— —	—

American Institute of Mining Engineers.

OFFICIAL BULLETIN.

Announcements to Members and Associates.

I. The dues for the year ending May, 1873, are now payable. All Members and Associates who have not paid their dues are requested to do so at once, by sending in postal orders, or checks, or money, ten dollars to the Secretary.

All Members and Associates who pay their dues for each current year, strictly in advance, will have sent to their address, regularly and weekly, the ENGINEERING AND MINING JOURNAL, which is the organ of the Institute, and will contain the proceedings and transactions, and all important papers read before the Institute and all notices of meetings. Back numbers cannot, as a general rule, be sent.

II. It is expected that the more important papers read before the Institute, and the debates thereon, will be published in annual or occasional volumes to which those Members and Associates will be entitled who have paid their dues.

III. All authors of papers are requested to notify the Secretary in advance of the meetings, giving the subject and length of their papers. Attention is also called, in this connection, to Rules 12 and 13.

IV. The ninth rule has been amended, so that there will be hereafter three meetings a year, in February, May and October. The meeting next October will be held at Pittsburg, Pa.

MARTIN CORYELL, Secretary.

Wilkesbarre, Pa.

THE
SCIENTIFIC PRESS, FOR 1872.
VOL. XXIV.

The weekly issues of the PRESS will contain reliable
Information for Practical Miners,
Treating on the Opening of Mines, Mining of Ores, Milling of Ores, Smelting of Ores, Separation and Roasting of Ores, Amalgamation, Saving of Gold and all Precious Metals, New Processes of Metallurgy, New Discoveries of Mines, Mining Engineering and Hydraulics.

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Our Mining Summary
Gives the progress of mining work from week to week in the various counties and districts throughout the principal mining regions of the United States, arranged in alphabetical order. It is the most extensive record of mining operations published in the world. It affords the intelligent miner a rare opportunity to know and profit by the work and experience of his neighbors. Miners have few sources of practical information in their calling, and should embrace every reliable means for improvement. Mining Operators and Shareholders, at home and abroad, weekly examine our Summary with increased interest and profit.

Our "Domestic Economy"
Embraces new and important facts which should be known in every cabin and household. Short and interesting—the articles under this heading are freely read and practiced with profit and improvement to the readers.

The PRESS is not strictly a "paper for professional, scientific men" but rather a
Liberal Popular and Scientific Journal,
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On a Double Sulphide of Gold and Silver.*

BY M. M. PATTISON MUIR, F.C.S.

ABOUT eight months ago, at the Thames goldfield, New Zealand, my brother, Mr. John M. Muir, in conjunction with Mr. William Carrick, made some experiments upon the action of sulphur on a molten mixture of gold and silver, with the view of applying the reaction to the separation of these metals on the large scale. These experiments resulted, however, somewhat otherwise from what they had expected; instead of a complete separation of gold and silver being effected by means of the formation of a sulphide of silver, they found what seemed a new compound produced. A sample of this substance they sent to me, an analysis of which I hope will not prove wholly uninteresting.

Before proceeding to the actual analysis of the substance, I shall briefly state the general method employed by my brother and Mr. Carrick when studying the action of sulphur on gold and silver. The crude gold containing silver was placed in a large pot upon the furnace, where it stood until the contents were molten. Into an iron mercury bottle turned upside down, by means of a screw-tap, was poured a quantity of sulphur; fitted to the other, that is, the downward end of the bottle, was a plumbago pipe. The sulphur in the bottle, by means of a furnace-fire, was now rendered liquid, and the bottle swung over the pot containing the molten gold and silver. The lower end of the plumbago pipe having been inserted beneath the surface of the molten mixture, the sulphur was allowed to flow down the pipe, and bubble through the contents of the pot. Before doing this, however, a thin film of borax was spread over the molten gold and silver. Quantities of Thames gold, varying from 20 ozs. to 160 ozs., were then treated, the operation being continued from ten minutes to an hour.

At the end of this treatment with sulphur, the pot was taken off the fire, and the gold allowed to solidify, the liquid borax and what they supposed to be sulphide of silver being then poured off. The borax was easily broken off after cooling, and the sulphide obtained as a cake. It was invariably, in all the experiments which my brother and Mr. Carrick conducted, found that the assay of the gold rose from 654 to 812, but there remained stationary, showing that by no means all the silver was extracted. The substance which they supposed to be a double sulphide of gold and silver—and this supposition has, I think, been confirmed by analysis—is a dark grey, hard solid, very much resembling many specimens of native Sb sulphide. It has a crystalline structure, can be cut by a knife, but is very brittle, and has a specific gravity of 8·159. By heating in a current of air it remains undecomposed. But, by fusion with Na_2CO_3, a sulphide of Na is formed, and a second alloy of gold and silver remain. After protracted boiling in strong HNO_3, almost all the silver is dissolved, leaving nearly pure metallic gold. I found that by gentle heating with strong H_2SO_4 for a long time, and subsequent treatment with hot water, it is possible to obtain all the silver in solution, the gold being left behind as a finely divided powder.

§ 1·1915 grms. thus treated gave 0·4252 grms. of gold=35·569 per cent. The filtrate, precipitated with HCl, gave 0·7799 grms. AgCl=0·5870 Ag=49·27 per cent. Another portion, weighing 0·5475 grm., heated gently with strong HCl and $HClO_3$, gave in the solution a precipitate of $BaSO_4$=0·6414=S, 0·0885=16·17 per cent.

From the results of my analysis, I have deduced the formula for the substance, of $2(Au_2S_3)5(Ag_2S)$.

The percentage amounts required by this formula, together with those actually obtained, are given below:

	Calculated.	Found.
Sulphur.....	15·87	16·17
Gold.....	35·47	35·69
Silver.....	48·66	49·27
	100.00	101·13

—*Chemical News.*

* Read before the Glasgow Philosophical Society, April 20, 1872.

On the Extraction of Bismuth from Certain Ores.

BY T. STERRY HUNT.*

I have lately had occasion to examine sulphuretted ores of bismuth both from Tudor, Ontario, and Lately, New Brunswick. The former consisted chiefly of bismuth-glance, carbonated at the outcrop and within associated with some metallic bismuth, iron pyrites and graphite, in a quartz gangue. In the second locality, where it appears to be present in considerable quantity, the veinstone is also quartz, but the associates of the bismuth-glance are chalcopyrite and galena. The treatment of such mixed ores in the furnace for the extraction of the bismuth could yield only a very impure product, and in view of the high price of the metal I tried with success a wet method for the treatment of the ore, which is based on well-known chemical reactions, and may, in some cases, be advantageously used.

The pulverized ore is dissolved by heat in commercial nitric acid, and the remaining gangue washed by displacement, first with a little strong acid, (which is used to attack a fresh portion of ore) and then with a moderate quantity of water, which is added to the first solution. This, if the excess of acid be considerable, may be partially neutralized by milk of lime or otherwise, and, then, after the addition of a little common salt, the bismuth may be almost totally precipitated by the addition of water, as a dense oxychlorid, which by fusion with black flux, or a mixture of carbonate of soda and charcoal, yields at once pure metallic bismuth.

The advantage of this method appears to be that it will permit the extraction of bismuth from mixed ores which cannot be advantageously treated otherwise, and moreover that it affects a separation of the bismuth from such foreign metals as would unfit it for pharmaceutical purposes. The economy of the process will evidently depend upon the cost of nitric acid at the place. It is possible that by a judicious calcination the bismuth ores might be converted into oxyd, thus saving a considerable proportion of the nitric acid in the subsequent treatment. I have not, however, tried this modification. When a basic sulphate of bismuth is obtained in admixture with sulphate of lead, the two sulphates may be decomposed by boiling for a few minutes with a solution of carbonate of soda, and the resulting metallic carbonate being washed and dissolved in nitric acid, the bismuth is thrown down by simple dilution with water.

* Remarks before the American Institute of Mining Engineers, May 23, 1872.

Phosphates in Russia.

Russia has large deposits of phosphatic matter. A. YERMALOFF shows, in a paper published in *Le Moniteur Scientifique*, that in that empire there are no less than 50 millions acres of land which will yield 5,700 tons of phosphate of lime to the acre. This contains 20 per cent. of phosphoric acid. The decay of the guano trade is evidently destined to have little effect upon the agriculture of the world, for that manure will be replaced by artificially prepared phosphates, and manufacturing industry will receive an important addition to its resources.

Gladstone's Estimate of Engineers.

Mr. GLADSTONE in an address delivered before the British Civil Engineers, gave utterance to what may be termed a *humorous* charge of matricide against the gentlemen to whom he was speaking. He said:

"This is an age, gentlemen, which appears to have been given in a special degree to you. During our own time, over which our memory reaches, it has arrived at gigantic development. There is but one personage, who, if she were gifted with a mouth and a tongue, would raise a voice against you, and that is your ancient Mother Earth. Whatever benefits you have conferred upon human kind, on her you have inflicted cruel suffering. The guilt of parricide, Mr. President and gentlemen, is great, but your iniquities are greater still, for you have mutilated and mangled your first parent, without putting an end to her existence. And when is this to end? You have already covered the civilized portion of the world, and you will rapidly pierce the uncivilized. The cataracts of the Nile are no longer secure. I believe that the next step will be a railroad across the great desert of Africa, underground as well as above ground. You will be compelled to employ yourselves, and when you have dealt sufficiently with the bowels of the earth there will remain to you the regions of the air. No doubt a period will arrive when, like Alexander sighing for new worlds to conquer, you will begin to think of the other members of the planetary system; but I do not think that will be in our day. For the present, I think, you have before you sufficient occupation."

Engineering and Mechanical Notes.

It is an evidence of the decided improvement which has taken place in the separation of the precious metals from their alloys, that the British Government has ordered the withdrawal of the crown and half-crown pieces. These contain 4 grains of gold to the Troy pound, a quantity which could not be extracted when the coins were struck, either because the processes then in use were not delicate enough, or were too expensive. Now silver containing two grains of gold to the pound can be profitably treated.

Engineering says that amateur engineering, of which India has to her cost seen so much, has received a blow in the North-west Provinces, as Government has taken all local works out of the hands of commissioners, collectors of districts and others, and placed them under professional supervision. Colonel Frazer, the chief engineer, in his report on the above reorganization, says that an expenditure of £120,000 was annually made in these provinces, with little or no control from an engineering point of view, and that "the work was placed in the hands of men picked up in a haphazard sort of way which could not insure efficiency, or in those of officials with no special training to enable them to carry out works properly," and he recommends that the Public Works establishment of the North-west Provinces "be recruited in future only by regularly trained men, duly appointed from the Royal Engineers or colleges in India and England."

The British naval authorities not having a war to develope the success or failure of their gun and ship engineering, have finally in desperation fired one of their own guns—the 12-inch, with 85 pounds pounder charge—at one of their own ships, the *Glatton*, a monitor. The interest of the experiment really centered in the fact that after trying for years to reject the Monitor system of ship building, the English made one concession after another until at last they have several fine monitors. The firing, which took place at 200 yards, was a victory for the ship, or rather the turrett. It was only scarred but not prevented from turning. The details of the test are looked for in this country with great interest.

The last number of the *Revue Universelle des Mines et de la Metallurgie*, published under the direction of M. de Cuyper, contains a somewhat remarkable treatise, by M. Philippart, on mechanical puddling by the Danks process. The *Colliery Guardian* says that the treatise or report of M. Philippart is very complete, from a descriptive, mechanical, chemical, and financial point of view. M. Victor Tabon, one of the engineers deputed by the forgemasters of Belgium to examine the Danks' process in England, has also delivered a report. M. Tabon endorses the views generally current in England upon the subject; and, assuming that Belgium produces annually about 700,000 tons of iron, he calculates that the Danks system will, if generally adopted, realise a saving of from £280,000 to £320,000 per annum.

The steel-headed rails have been found, on trial by the engineer of the Reading railroad, to separate at the welds to an extent of twenty-five per cent. of the rails laid down.

THE ENGINEERING AND MINING JOURNAL.

ROSSITER W. RAYMOND, Ph. D.,
JOHN A. CHURCH, E. M.
Editors.

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Trade and Speculation.

WE spoke last week of the "folly" of American capitalists, who prefer the chances of Wall street and the risks of speculation, to more stable investments in mines, furnaces and industrial enterprises generally. In saying that, we referred chiefly to the relations of capital to western mining. But the assertion is quite as true of the iron trade. In certain parts of the country there are, undoubtedly, men whose minds are made up to invest in any good industry that offers, and whose money is always ready. But even they have not the activity of their English rivals. English capital is like a spring, contracting under pressure, but following up with instant elasticity the first lightening of the load. Were our iron masters to show the same disposition to take advantage of the present hopeful prospects of the trade that their competitors across the water do, the production of American iron would within the next two years bear a different relation to the make of the world from that it does now, excellent as our standing is. "Of late," says RYLAND'S *Iron Trade Circular* in reporting the condition of the Cumberland region, "blast furnaces have been springing up on all sides, and new avenues abounding with ore have been opened up, and worked to very great advantage." Iron ore is quoted at twenty to thirty-five shillings, English, a ton. In speaking of the rise in the price of coal, the same paper says: "Of course no one can blame the coal masters for making hay while the sun shines, and they have a right to their share of the present insatiable demand for British iron, but only to their share, and they must be careful not to kill the goose that lays the golden egg. Not, however, that there is any immediate or serious danger of such an eventuality so long as the United States and the continental consumers are so enamored of our manufacture, that to meet their requirements we are compelled to import foreign ore, and so long as the markets referred to, continue to manifest their willingness to pay for its manufacture here and its transport hence." Our own iron manufacture is, of course, expanding, but not at such a rate as that of England. Undoubtedly, the reason lies partly in the far greater wealth of that country. We cannot yet count upon four thousand million dollars as the yearly income of our people, and if we could, it would not be concentrated in so few hands as there. But making allowance for all such considerations, it is still undeniable that our capitalists can safely move with more decision in undertaking industrial operations. It is better to let foreigners build our railroads than our furnaces, and far more profitable in the end.

We do not doubt the activity and enterprising spirit of American capitalists; but we do not believe that furnaces abroad go begging for owners just at present. Furnaces that are ready built and can be purchased or leased, have a value in view of the probable state of the market for the next year or two, far above that which belongs to them under ordinary circumstances. Prices are now so high, and profits so good that a furnace which can be in blast within a month, is worth to the owner or worker, very much more than one, the foundations of which are still unmade.

Amalgamation a Chemical Act.

The experiments of Mr. COLVER on amalgamation, which are given in another column, will attract attention in the West. He studies the subject on its chemical side and demonstrates the different chemical intensity of the various kinds of amalgams. He shows also that, though mercury cannot attract gold and silver from a distance as a magnet attracts iron, certain compounds of this with other metals can do so, to a small extent. If Mr. COLLYER wishes to benefit the great gold mining interest of this country he will do well to inform us more exactly of the order in which amalgams may be ranked in regard to their chemism or intensity of chemical activity, and also study the subject under the aspects which it presents in the gold mill. Gold in very fine powder and enclosed in a stream of swiftly running, muddy water does not duplicate the conditions of the experiment where gold leaf was held in air very near an amalgam. It is extremely doubtful if the magnetic influence has power enough to overcome the turmoil of a stream of slime, an eighth of an inch thick, running down a plate inclined at five degrees. Indeed we know enough about amalgamation to be certain that the loss is of two kinds; 1, gold that is still enclosed in larger grains of rock; 2, float gold, perfectly separated from the rock, but so fine that each particle offers too much friction surface to be carried down to the plate by its own weight. There is no reason to suppose that this float gold is always on the *top* of the stream. Before it leaves the plate it must approach the amalgamated surface very closely, and if the electro-chemical magnetism were worth anything as a factor in practical amalgamation, the experiments with sodium amalgam ought to have exhibited some gain in gold; which, however, they failed to do.

Mr. COLLYER deserves the thanks of the Western mill men for what he has done. Important and interesting as the subject is, we do not know that any American chemist has made it a matter of principal moment in his studies. We hope that in the general increase of chemical knowledge, and study of industrial chemistry our amalgamators will not be neglected. Indeed we feel confident that not many years intervene between a better understanding of amalgamation, and the introduction of more satisfactory methods in our mills.

The American Institute.

Preparations are being made on every hand for the Fall Industrial Exhibitions. The American Institute has issued its circulars in preparation for the exhibition at the Rink in Third Avenue, New York, where for the forty-first time, it will call upon manufacturers and inventors to expose their productions in competition with those of all their rivals. Special attention will be given to machines, a department which increases in importance every year. The committee composed of Professor Thurston, Robert Weir and Charles F. Allen, propose to continue the test of boilers with a more efficient apparatus—and to have trials of stationary and portable engines, similar to the English tests, with some improvements; of water meters, which are now agitating the Water Commissioners and Engineers of every large city in the world; of rock boring machinery, pumping engines, air compressors, traction engines, and we presume of any other machines offered for their inspection. The institute will this year return to its former custom of awarding medals and diplomas. Among these there will be three leather medals in the best sense of the term; that is, they will be *gold* medals given to the tanner of the best leather. Mr. JACKSON S. SCHULTZ is the gentleman who proposes to stimulate the labors of the tanners by this means. He offers one medal for the best pure oak tannage; one, for the best pure hemlock tannage; and one, for the best mixed or union tannage. Exhibitors of heavy machinery will find their departments open by August 15, this three weeks time being given them to lay their foundations. Pamphlets and circulars can be obtained from the Corresponding Secretary, American Institute, New York.

OUR contemporary, the *American Artisan*, signalizes its entrance upon a new volume, by not only enlarging its size, but also increasing its usefulness as a scientific journal, in many ways. It now takes its place visibly where it has always really stood, among the foremost of our professional periodicals.

New Publications.

KERL'S NEW METALLURGY.

Grundriss der Allgemeinen Hüttenkunde, von BRUNO KERL, *Professor. Mit* 163 *in den Text gedruckten Holzschnitten. Leipzig: Verlag von Arthur Felix,* 1872.

The present volume is the first one of three which are intended to cover the whole field of metallurgy. It treats "General Metallurgy," while the two following will be devoted respectively to the metallurgy of iron and the metallurgy of the various other metals. Each volume will form a whole for itself, entirely independent of the other two. The immediate object of the work is to serve as a guide for teacher and student; but it will also prove to be of vast benefit to the practical metallurgist in the discharge of his duties. To increase its value for the latter purpose, copious quotations from the literature of metallurgy and chemistry are appended, the use of which renders an insight into the latest results of practice possible. Compared with the larger *Handbuch der Metallurgischen Hüttenkunde* of the same well known author, the present work is, of course, much more condensed, as the title intimates; but it is superior to the large work by reason of the later period, down to which it brings the record of progress. At a time when the science of metallurgy makes such rapid onward strides, as it has done for the last few years, it is impossible to keep pace with it in large handbooks, and such works as the present, which forms

a supplement to older writings, besides comprising the substance of the science in abbreviated form, will always be welcome to the profession.

We notice, besides a record of all the inventions made of late years in various parts of the world, a very full chapter on coking, a subject which was not treated in the former works of Prof. KERL with that fulness which it deserves. This part of the work is of especial value for the metallurgists of this country, where coking is yet in its infancy. The part of the work devoted to furnace-gases and generator-gases will also be highly valuable to many of our metallurgists.

To the older chemical formulae in the chapter on "Metallurgical Products," the molecular formulae, according to the modern atomic weights, are added; and the subject of "Slags," so important for the metallurgist, is treated, as far as the space permitted, with the great care characteristic of the author.

The cuts accompanying the present volume are excellently executed upon a plan which conveys, even to the student comparatively unfamiliar with books and drawings, a clear notion of the structure and functions of the apparatus illustrated.

We wish there were an English translation of this admirable manual: though, on the whole, it is better to wish that every American metallurgist might master the German language, the treasures of the technical literature of which, while they are too great in amount to be bodily transferred to any other language, are so rich and valuable as to be indispensably necessary to a thorough knowledge of many branches of applied science, and of none more than of metallurgy.

ANNUAL RECORD OF SCIENCE AND INDUSTRY FOR 1871. *Edited by* SPENCER F. BAIRD, *with the assistance of eminent men of Science.* New York: Harper & Brothers, 1872.

Nobody in this country is better qualified than Professor BAIRD, by general culture, scientific training, knowledge of technical literature and access to its sources throughout the civilized world, to prepare a volume of this kind. His position for so many years in the Smithsonian Institution not only guarantees his personal competency for the work, but affords him unusual facilities for its execution; and the book itself fully satisfies the expectation of its excellence which these considerations led us to entertain. It is far superior to the scrap-compilations which have been issued from other sources under similar names. The material is well chosen, intelligently condensed and rewritten, scientifically arranged and admirably indexed. Much of it appeared during the year in the excellent scientific summaries in *Harper's Weekly* and *Monthly;* but it is now provided with complete references to the original authorities, so that the student can follow up thoroughly any hint or suggestion derived from these pages. We trust that Prof. BAIRD will continue from year to year this most useful work; and that the patronage of the public may be such as to justify his patient and acute labors. We note some trivial defects and errors in this volume. For instance, there is an allusion (page xxii of the introduction) to the *disintegration* of lead ores by zinc. *Desilverization* was probably meant. Other metallurgical notes are rather meagre and unsatisfactory: in fact, metallurgy is, perhaps, the weak point of the Record.

A New Ore of Silver.

Mr. WEBSKY has found a new silver mineral at the Frederika Juliana Mine in Silesia, and has called it Julianite. It is lead-gray inclining to red in color, acquiring a dull-black tint by exposure to the air, and is comparatively brittle. Its sp. gr. is 5.12 and an analysis showed it to consist of:—

Sulphur	26.503
Arsenic	16.783
Antimony	1.421
Iron	0.787
Silver	0,538
Copper	52 298

From this its constitution is inferred to be

$$(\cdot 9\ As. \cdot 1\ Sb.\ Fe)_2\ (Cu.\ Ag_2)_3\ S_8.$$

—*Zeitschrift der Deutschen Geologischen Gesellschaft.*

The Amalgamation of Iron.

Mr. VERPLANCK COLVIN lately read a paper before the Albany Institute on "New Phenomena in Chemistry." He says:

Remembering that the fluid mercury with which we are familiar is but the molten substance of a solid ductile and malleable metal, we arrive at the conclusion that amalgams are simply the *alloys* of mercury as metals dissolved in melted lead would be alloys of lead. Now the alloys of mercury are peculiarly easy to examine; for even when in the fluid state they do not burn one's fingers, and by analyzing amalgams we are able to discover the condition of the metals contained in them. Having prepared an amalgam of gold and dissolved it in an excess of mercury, I treated the fluid amalgam with nitric acid. When the quicksilver had entirely dissolved, there remained a small spheroid of gold, dark upon the surface, and when broken apart under the hammer, exhibiting a radiating crystallisation like that of globular iron pyrites. This, and other experiments (which I have not time to describe), appear to prove that a metal when amalgamated is really dissolved; and it is possible that if the reduction of the amalgam had been less rapid, a well-formed crystal of gold might have been obtained. The metals of the second class seem also to be actually dissolved in the mercury.

Mercury has been employed from time immemorial, in separating the precious metals from their earthy associates. Originally the *pure* metal was employed, as indeed it still is to a considerable extent, held in little rifts or gutters in the trough or sluice where they washed the auriferous sands or pounded ore. This was also the method of amalgamation at the stamp-mills, and it is notorious that much gold passed over the mercury in this process, and escaped. Recently I observed in the gold mining regions of the Rocky Mountains, at Central city and Nevada, Colorado, that for the rifts and gutters filled with mercury, they had substituted sheets of copper, superficially amalgamated, over which the ore reduced to a thin mud, or muddy water, was washed, its gold parting and adhering to the surface of the amalgamated copper, and doing so more readily than it would to the surface of pure mercury.

Here we have another instance of that *combination action* which we have already noticed in the potassium and sodium amalgams, as evinced by their power to unite mercury with the metals of the second class. It appears that those metals of the first class which are softest, lightest, and most easily oxidised (as potassium, sodium, zinc, &c.), have the power to enable the harder, heavier, and least oxidisable metals of the same class (as copper, silver, and gold), to combine more readily with mercury than they would unassisted; and, further, to enable mercury to combine with the metals of the second class, which, though generally harder and more brittle than any of the preceeding, are often readily oxidised. This *combination-action* separates the alloys of mercury from all other alloys, so far as we now understand them; for, as I have already shown, instead of the mercury always losing power as a metal solvent in proportion as it becomes alloyed—it shows a preference—and when combined with portions of the readily oxidisable metals, becomes more active and indeed almost ferocious in its appetite for the metals and alloys that are of a highly electro-negative character; while if alloyed with sufficient gold or silver in the first instance, it appears satisfied, phlegmatic, and indifferent to further metallic food. Experiments which I have made demonstrate that cyanide of potassium *does not* answer as well as the amalgams of the alkaline metals, in effecting the union of mercury with electro-negative metals, as some have asserted. Its solution is, indeed, not more effective than aqua-ammonia in producing such results, and what efficacy either of these solutions possess may be attributed to their cleansing the surface of the metal to be amalgamated.

It now becomes evident that the separation of metals into the two classes is incorrect, as we have here, as in every other general classification in science, no absolute division, but merely extremes and means; the true mean being difficult to determine. The reactions of these amalgams of the electro-positive metals with those metals which are relatively electro-negative, are very instructive. They tend to prove that all the amalgams subsequently formed are the results of *electrical action*, to induce which we have only to place a particle of iron in contact with potassium amalgam and with water. In an instant we have a voltaic battery in active operation; the amalgamated potassium forming the "zincode," while the iron is the electro-negative element of the battery. Of the metals present the mercury is the electro-mean, and with the oxidation of the potassium, it passes over to and effects a combination with the iron.

Thus we arrive at a more correct classification, and at a law of preference of metals and alloys for mercury:—

1st Law.—Metals that are easily alloyed with mercury give place to and assist the less amalgamatable metals in combining with mercury, when in the presence of an acid or corrosive liquid or atmosphere, which attacks the metal already amalgamated, and which does not attack, or does not so violently attack, the metal to be amalgamated.

2nd Law.—The more intense the action of the acid or corrosive liquid or gas upon the metal in the original amalgam, the more rapid the formation of the secondary amalgam.

3d Law.—The amalgams of electro-positive metals assist those metals which are relatively electro-negative in combining with mercury.

These laws are the results of experiments which, as examples, I will now proceed to describe and illustrate. Placing before us mercury—1st, in the pure state; 2nd, amalgamated with copper; 3rd, zinc amalgam; 4th, aluminum amalgam; 5th, sodium amalgam; 6th, potassium amalgam; and 7th, "ammonium amalgam" (hydrogenium?)—we may suppose that we have the extremes and some of the means of mercurial power; mercury in the *pure passive* and in the compound induced *active* state. To prove that it has a passive and an active condition, it is only necessary to exhibit gold leaf before the pure mercury and each of the several compounds mentioned.

First.—It will be seen that with mercury alone it does not readily amalgamate, and there is no attraction of the gold leaf toward the metal.

Second.—Held above the amalgamated copper there is no attraction, but the moment the gold is allowed to touch the surface, it is eagerly seized and devoured.

Third.—Held above zinc amalgam excited with chlorhydric acid, the gold leaf begins to waver and tremble slightly as though influenced by the amalgam. Touched to the amalgam it is seized and vanishes instantly.

Fourth.—Above the sodium amalgam, excited with water or aqua-ammonia, we have the same symptoms, but even more excitement and eagerness on the part of the gold leaf to pass to the amalgam as it is approached; and the gold is scarcely touched ere it is gone, licked up by the hungry amalgam.

(This action is only seen when but short distances intervene between the gold leaf and amalgam, an eight, or sixteenth of an inch. To perform the experiment successfully, the water should just cover the amalgam, and the edge of the gold leaf should be allowed to dip a little into the water.)

Fifth.—With potassium amalgam the action is greater.

Sixth.—With the hypothetical hydrogenium or ammonium amalgam, I have found *less action* than the supposedly high electro-positive character of the metal (?) would indicate. This might be accounted for by the porous condition of the amalgam, owing to the gas contained (nitrogen?) and consequently

much diffused state of the "metal." I notice this last experiment and reaction merely because it may be valuable in determining whether such gaseous metals exist.

The result here seems to be that we have now for the first time a metallic compound capable of attracting the precious metal gold, when but a short distance intervenes. We can amuse ourselves with the idea that upon this principle a compass may be constructed (a tube charged with the amalgam), which will be to the prospector and gold hunter as the magnetic dip needle is to the searcher after iron ore. Still, there is something inexplicable about it, for this apparent attraction of gold can hardly be magnetic, and it seems to me we must look for explanation to cohesive molecular power.

TO BE CONTINUED.

About-Town Jottings.

BUSINESS AND PERSONAL.

Personal announcements and business notices inserted at fifty cents per line.

Root's Wrought Iron Sectional Boiler, manufactured by the Root Steam Engine Co., 500 to 510 Second Avenue, New York.

Utica Steam Engine Co. (formerly Wood & Mann Steam Engine Co.,) 42 Cortlandt street, N. Y.

Post & Goddard have removed to No. 111 Liberty street. Dealers in Taps, Dies, Reamers, Drills and supplies generally.

American Submerged Pump. Power attachment—cheapest and best in the market, 55 Chambers street, N. Y.

Roper Caloric or Hot Air Engine, 124 Chambers St.

Blake Bros., New Haven, Conn., manufacture Stone Breakers for crushing ores and minerals of every kind into small fragments, preparatory to their further comminution by other machinery.

The Niagara Steam Pump Works, 23 Adams street, Brooklyn, N. Y., are now working to their fullest capacity.

MINING SUMMARY.

Montana

From the Deer Lodge *New North West* of June 22.

PHILIPSBURG DISTRICT.

The town of Philipsburg, located on a small stream, Camp Creek, flowing from the east into Flint Creek was laid out in '67, and built up more rapidly in better shape than any other mining town in the Territory. The future prosperity of Philipsburg was based upon the richness of many silver bearing veins, rivaling the famous Comstock in Nevada. There was, and is yet, the widest field of remunerative employment of capital; and had it not been for the failure of the St Louis and Montana Mining Company's "James Stuart Mill," erected at a cost of $135,000, to give results reasonably expected from richly prospecting ores, Philipsburg, in place of containing 225 inhabitants to-day, would number them by the thousand. Outside capital failing to come in, it was left to home investments to prove that the boasted wealth of this district was a fact. The hand stamp process for years gave the persevering prospectors the means of living. Rude arastras made good clean-ups, furnishing proof sufficient to expect gratifying results with proper machinery. Such facts being demonstrated, a home company, the

IMPERIAL SILVER MINING COMPANY

Was organized in 1871, who erected, three quarters of a mile up Camp Creek, a five-stamp mill and roaster. After much costly experimenting, the right process for working the ores of this district was hit upon, and the precious silver extracted in large quantities. The mill when erected had wooden stamps, which soon wore out, and it was laid up for repairs. Meanwhile, the I. S. M. Company made contracts with the Stuart Mill to crush 500 tons of their Speckled Trout ore, which necessitated the alteration of that machinery, at their own expense, from wet to dry crushing and the additional erection of two roasting furnaces, situated 100 feet from the mill in a substantial frame building 31x96 feet, each with an arch 15½ feet, and 11 feet wide. A double tram-way connects the roasters with the mill, one leading from the battery to and above the furnaces, where the charges are put in; the other from a level with them to a point above the Wheeler pans in the mill, where the chloridized pulp is delivered ready for amalgamation. The process of extracting the silver is known as the Reese River chloridizing process. The ore, after being dry crushed under the ten stamp battery into the finest pulp, is mixed with six per cent. of common salt, then placed in the roasting furnaces and under continued agitation with long handled iron hoes, for four hours and a half, subjected to a gradually increasing heat, in charges of about 1200 lbs. to each roaster. After being drawn and cooled, the pulp is run back to the mill and goes through the amalgamation process in six Wheeler pans, under the skillful manipulation of Edward T. Maynard, well known as one of the best amalgamators in Montana. The wet pulp, agitated in hot water and quicksilver, after every four hours is drawn into two settlers, large wooden vats with cast-iron revolving arms, from whence it passes through a small pan, where the last of the amalgam which had escaped from the large pans and settlers, is saved. The solid amalgam of which 3118½ pounds were delivered in the retort room during the last five days, is here receiving the last touch by Joe Searish, the retorter, who turns out the bullion at the rate of over one thousand dollars a day now. A new retort of larger capacity has been received and will immediately be put in place of the old one. Retorting goes on day and night, still the amalgam is made faster than the one retort can work it up. There is at present *half a barrel* of solid amalgam awaiting to be retorted.

CAPACITY OF THE WORKS.

Through the politeness of Fred Kennett, Esq., general superintendent of the company, I am enabled to state that the capacity of the ten stamps is eight tons per day (24 hours.) The six pans, however, have the capacity to work twelve tons in the same length of time. The cost of milling and roasting the ore is $40 per ton, and the yield per ton, as near as can be ascertained before a clean-up is made, is $125

The flattering success made by the I. S. M. Company, has given courage to every one in the camp, and the silent little burg is assuming a livelier aspect. The company employ about 70 hands as miners, wood choppers, charcoal burners, mechanics, mill men, and cooks. Two boarding houses, one in town, the other near the mines, where superintendent Charles Frost's office is located, feed this little army of men, and good, clean and healthful is the bill of fare on those tables, as I know from actual experience.

The ledges of the district, of which about 400 locations are made and recorded, cannot be mentioned here in detail, and but a few visited under the gentlemanly guidance of Mr. J Frasier, foreman of the mines in the "Speckled Trout" ledge, will our small space admit of naming. The ores of this district prospect richer in silver than those of any other district yet opened in the Territory, and show larger deposits and true veins. The formation is limestone, which, however, may change to a more primitive formation on attaining a sufficient depth.

THE SPECKLED TROUT,

The property of the I. S. M. Company, is a true fissure vein of argentiferous galena, varying in width from three to eight feet, giving an average assay of $150 to the ton. The main shaft is on discovery claim, with a dip south of 80°. Two levels are run from it north-east at a depth of 40 and 80 feet, showing as fine a solid body of ore as can be seen in any silver mine. On No. 3 W. the ledge has been struck in an open cut and short incline of about fifty feet, exposing a vein of the same character and size as on discovery. East on No. 2 the Company have men at work on the same ledge, demonstrating the existence of this rich lode over 1200 linear feet in all.

South of and parellel with the Trout, the Portland is now being opened up by Mr. C. N. Freeman. A promising, well-defined vein between smooth walls yields ore which assays as high as $400 per ton. Further south is

THE GREY EAGLE.

Mr. John Kane is doing good work in developing as good a ledge of argentiferous rock as the district can show. A well timbered shaft of twenty feet depth has exposed a vein of ore 18 inches wide, of the same character as the Trout.

THE POCOHONTAS

Further south, is owned by the I. S. M. Company, and from the size of the ledge, which is just being exposed, and furnishes rich prospecting specimens, promises to achieve a great reputation.

THE POTOSI,

Located on a small stream (Brown's Gulch) tributary to Flint Creek, is one of the earliest discoveries; has been developed to a depth of fifty feet, and shows a vein of six feet free milling ore, specimens of which have yielded as high as $1200 per ton by fire assay. This valuable property is owned by Frost, Merrill & Co. The best mill-site in the district is located immediately adjoining the Potosi, with a never failing stream of water and inexhaustible supply of timber.

THE EASTERN COMANCHE,

The bone of contention some years ago in one of the most expensive lawsuits in this Territory, is developed over a larger extent than any other ledge in the district. Thousands of tons of ore are in sight, of which the major portion is on Mr. H. Cogswell's claim, but lies idle with its hidden treasure for want of capital to introduce the right kind of machinery to extract the fortunes contained in the rock.

THE LITTLE EMMA,

Located on the highest point immediately above Philipsburg, is the real poor man's ledge of the district. Messrs John Ullery & Co. in a sixty foot shaft, have a six foot vein of ore, free from all base metals and adaptable to the simplest milling process.

THE HOPE,

[Original Comanche] property of the St. L. & M. M. Co., is being worked a depth of 150 feet, and furnishes a fair lot of ore, which it is supposed will be worked in their mill sometime this year.

There are many more valuable ledges besides those named, and the question naturally arises: Why is not Philipsburgh more prosperous with all this surrounding wealth? The answer is easily given. The richest mines are in the hands of poor men. The first mill erected by foreign capital has never made a success on any ore tried while under management of its own company, and other capitalists noticing the failure of this first experiment, hesitate to make a venture. That there is wealth beyond computation in the ores of Flint CreekDistrict is being demonstrated by the Imperial Silver Mining Company every day, and every one may judge for himself by examining the masses of amalgam hourly taken from the pans.

In a few weeks this company will start up their own mill and roaster, opening a new channel through which tons of silver will find its way into the pockets of the people of Montana. Mr. A. Green, who owns one of the finest ranch locations on Upper Flint Creek, three-quarters of a mile below Philipsburg, has agreed to haul the first ton of silver from Philipsburg to Helena free of charge, and at the rate the bullion is now being produced, another week will find the precious load on the road. When the first evidence of Flint Creek Silver Mining District prosperity reaches the Metropolis, I hope all those skeptical about the rich mines of Montana will give it a glance and growl no more.

New Mexico.

Grant County, N. M.—Its mineral resources, Silver City and vicinity, climate etc.

(From our own Correspondent.)

Probably no portion of the mining world is as little known and as generally misunderstood as Grant Co., New Mexico. Scarcely two years have elapsed since rich discoveries of silver were made in this vicinity, and in that short space of time a hardy race of pioneers has developed a few of the wonderful resources of this remarkable country. When it is remembered that this country is remote and isolated in its geographical position, far distant from lines of travel and communication, and surrounded by tribes of hostile Apaches who have until recently defied all attempts at subjugation, the difficulties experienced by the pioneer miner will be readily understood and appreciated. Added to this, the rich mineral discoveries in Utah and other localities of easy access have greatly retarded the march of progress in this direction. The immense furore created by the remarkable wealth developed in Nevada and Montana has tended greatly to depreciate in public estimation other localities possessing superior advantages and more extensive resources.

Despite all these obstacles the progress of Grant Co. has been rapid and permanent, mining camps are springing up in every direction, and population is gradually increasing. Silver City, the county seat, is the centre of present mining operations. The town is beautifully situated in a charming little valley, flanked on both sides by rolling hills filled with precious metals and covered with timber and grass. The town has a population of about one thousand, consisting chiefly of miners and their families, although most of the trades and professions are well represented. Some of the buildings of Silver City will compare favorably with those of large towns in the east. Brick is now being extensively manufactured, and that material will be used almost exclusively for building purposes in the future.

The great advantage which Grant County possesses over every other mining country is its superb climate. No extremes of heat and cold are known here, but the

weather maintains that delightful medium between the two which renders labor rather a pleasurable task during the entire year. There are but four (4) small mills in this district at the present time and two more are on the road. Three of the mills have been running to their utmost capacity almost constantly, but have not been able to meet the requirements of the district by one fifth. As a consequence tons upon tons of rich ore are lying in all directions awaiting reduction, and the prosperity of the country is greatly retarded for the lack of sufficient means to develop its immense resources. The shipment of silver bullion from this point alone now averages about five thousand ounces per week. This is the results of the work of our three mills, of small capacity. With one hundred and fifty stamps and a large smelting establishment the product of this county would soon astonish the world.

It has been satisfactorily proved that the whole country for a radius of two hundred miles is literally filled with mineral. Gold, silver, copper, iron, and lead abound in the greatest profusion, all awaiting capital and industry to bring to light the hidden treasure buried in this vast area of country. Below will be found a brief statement of the product of each of the mills at this place for the week ending June 22d.

From this can be formed some idea of the richness of the ore in this locality which is not surpassed in many other mining districts on the continent. When the resources of this country are thoroughly known and its beautiful climate and healthful atmosphere are thoroughly appreciated, then this locality will assume a grandeur and importance in the business world which nature has intended it to occupy. MINER.

Statement showing number of tons of ore worked and value of silver extracted during the week ending this the 22d day of June, 1872, at Silver City, Grant County, New Mexico.

By whom.	No. of tons.	Mine.	How worked. Arrastras.	Stamps	Pans.	Barrel-wo'k	Ball Pulverizer.	Refined Silver. $ cts.	Remarks.
W. H. Brennan	21	Seneca.	..	5	..	3	..	2422 00	Engine from Pinos Altos.
Wilbiro, Webb & Co.....	5½	Dexter.	2	..	..	3	..	532 60	
Wisconsin Mg. Co.	17	2 Ikes.	..	..	2	..	1	1050 10	Pans, Peterson and Peterson.
J. U. Stevens.....	9	2 "	3	..	..	2	..	786 00	Engine from Pinos Altos.
By Amalgamation.....								$4790 60	
Extracted by small furnaces—blast from blacksmith bellows.....								$2200 00	
Result of week.....								$6990 60	

Utah.

Correspondence of the Salt Lake *Tribune* of June 29.

BIG COTTONWOOD DISTRICT.

The mines of this camp are on the so-called Emma Belt. The summit of the Emma hill runs nearly east and west, and is divided between the two districts. The mines run in a north-easterly direction, generally, thus passing over the summit of the range into this district, and time will disclose as valuable mines here as any in Utah. The Zoe Mine, or rather prospect, for that is all it is as yet, promises to rival any mine yet found. It is owned by OSCAR YOUNG & Co., and the friends of OSCAR, and they are numerous, will be pleased to hear of his good luck and to know that he is on the sure road to fortune without the aid of the Tithing office. The Zoe Mine is at present a copper mine but rich in silver, and most likely will, when developed, run entirely to silver.

Many new and valuable discoveries have already been made here this season, as there is no better or surer field open for the prospector in Utah. The snows are all gone, except in the high gorges on the north sides or in the deep mountain gulches, and there is still a plenty. The roads are all dry and even dusty. Splendid roads run up to the Big Lake and up to all the mines, except that up the Silver Fork and Evergreen Gulch there must be a little shoveling done to clear the track, all of which will be done this week.

California.

We are indebted to the San Francisco *Bulletin* of July 5 for the following budget of mining news.

AMADOR COUNTY.

The *Ledger* of the 29th says: At no period in the history of quartz mining in this country has the prospect been more cheerful than at present, and if no serious drawbacks should happen to our developed mines to retard their daily operations, the gold yield for the present year will be far in advance of its predecessors.

The mines at Sutter Creek are looking remarkably well, and new improvements and machinery are being added to nearly all of them in the vicinity.

At Amador, the Keystone holds its own bravely, yielding its tribute of $40,000 to $50,000 per month, affording employment to hundreds of persons and adding largely to the business and permanent wealth of the county. The original Amador, near the Keystone, will soon set its forty ponderous stamps in motion.

At Drytown, the main shaft on the Gover is being rapidly sunk, and as we learn, with flattering prospects of a permanent paying ledge.

At the new town of Plymouth, the Phœnix mine is being developed. At the present depth of the main shaft, 500 feet, the ledge has attained the width of twenty feet without defining its full extent, and the whole of the ledge ranging from ten to one hundred dollars per ton. A forty-stamp mill is now being erected.

The Alpine, a continuation of the Phœnix on the north, at a depth of three hundred feet is turning out excellent rock, and gives every assurance that it is a valuable mine.

Near Jackson, the Kennedy is fast assuming its position among the most valuable mines in the country; the average yield of the last crushing reached twenty-four dollars per ton, and the rock increases in value and quality as greater depths are gained.

The Oneida, north of Kennedy, likewise is one of the most valuable mines of the country. East of Jackson, near the foot of the Butte, is the State of Maine mine, and as far as the ledge has been sunk upon gives evidence of permanent value. A fine water-power mill connected with the mine is fast approaching completion.

The Markle mine, situated north of Volcano, is doing better from the number of stamps employed than perhaps any mine in the country. The Markle establishes the fact that rich gold-bearing ledges exist in the county outside the Amador Belt, and that capital may safely be invested in the numerous undeveloped ledges in the belt wherein the Markle is situated.

Work has been resumed upon the Newton Copper Mine, situated on the turnpike leading from Jackson to Ione City.

In addition to our quartz resources, we have a large area of unworked placer ground, which will afford profitable employment to hundreds of men as soon as water can be had.

BUTTE COUNTY.

The *Record* of the 29th gives the following concerning the Cherokee mines: The mines at Cherokee are worked by hydraulics, and are in the main owned by three large companies, viz., the Cherokee Mining Company, employing a large number of men and realizing about $100,000 each season. This company is building a large ditch from Butte Creek, about sixty miles in length. About ten miles are now completed. The entire work will not not be accomplished before next year, as there is much piping to be done.

CIVIL AND MECHANICAL ENGINEERING at the RENSSELAER POLYTECHNIC INSTITUTE, TROY, N. Y. Instruction very practical. Advantages unsurpassed in this country. Graduates obtain excellent positions. Regents Sept. 11th. For the Annual Register, containing improved Course of Study, and full particulars, address Prof. CHARLES DROWNE, Director. June 25-3t

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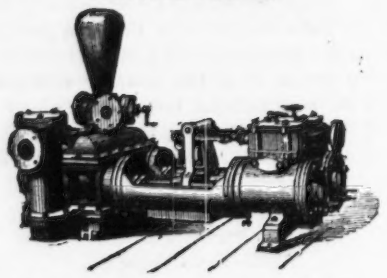

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MISCELLANEOUS.

TO OWNERS OF MINES.

The "St Louis Smelting and Refining Co,"

will commence operations on the 1st of July, when they will be prepared to smelt ores of Silver and Gold, or refine Base Bullion, on commission or to purchase the same. Correspondence is solicited from all parties having these materials for sale or reduction, stating the character of the ore and the amount which may be depended on for regular supply, whenever such parties propose to furnish material regularly.

Address: J. H. HOWARD, Gen'l Sup't,
June 4-2m 515 Chestnut street, St. Louis, Mo.

THE STOLBERG MINING AND SMELTING CO.

AIX LA CHAPELLE, RHENISH PRUSSIA,

has requested their undersigned agent to negotiate for either consignments or the purchase of American Lead and Zinc Ores. Parties in possession of such ores may find it to their advantage to address for particulars to

W. PAULSEN.
jj23:2m P.O. Box, 5,292, New York.

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Also, Manufacturers of Block-Tin Pipe, Sheet-Lead, Lead-Pipe, Solder, &c.

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MISCELLANEOUS.

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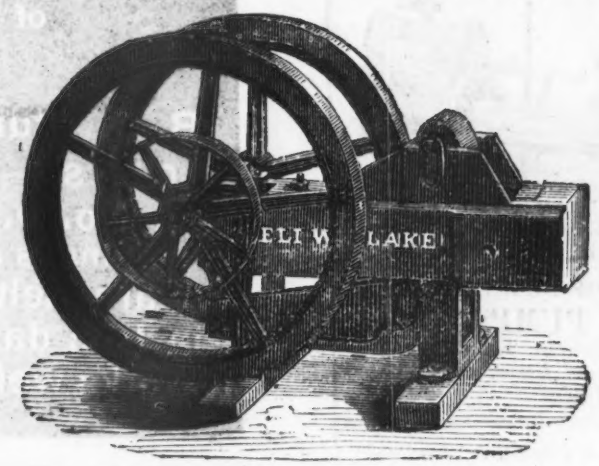

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☞ The Patents obtained for this machine in the United States and in England having been fully sustained by the courts, after well contested suits in both countries, all persons are hereby cautioned not to violate them; and they are informed that every machine now in use or offered for sale, not made by us, in which the ores are crushed between upright convergent faces or jaws actuated by a revolving shaft and fly-wheel, are made and used in violation of our patent.

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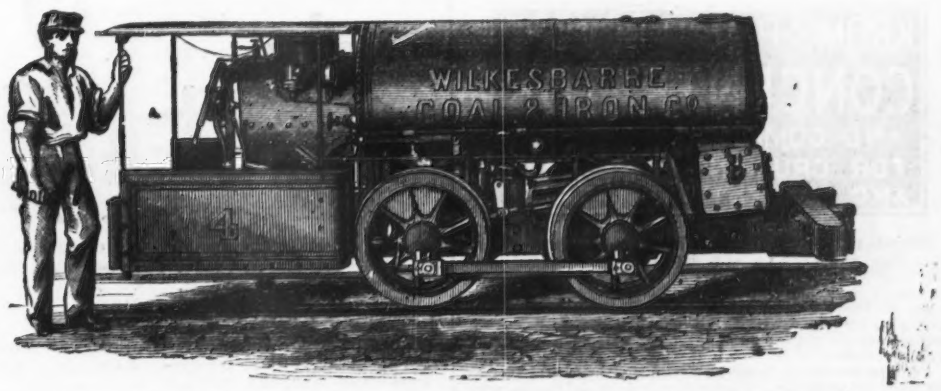

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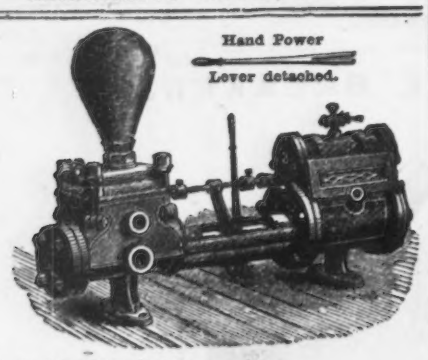

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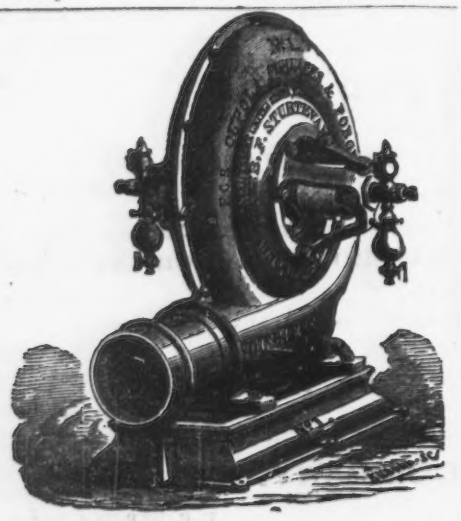

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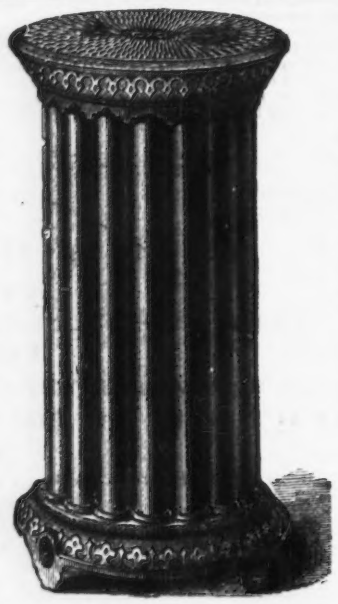

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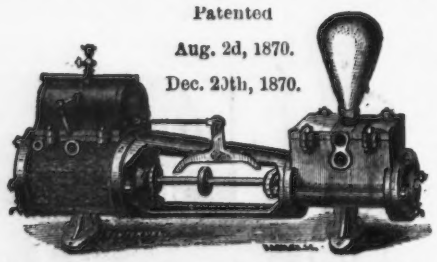

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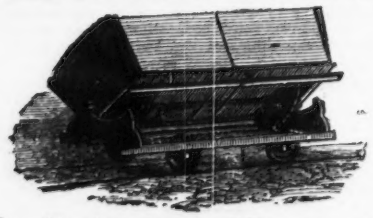

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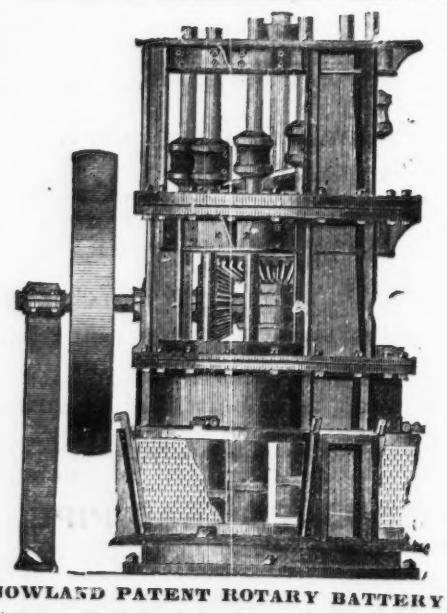

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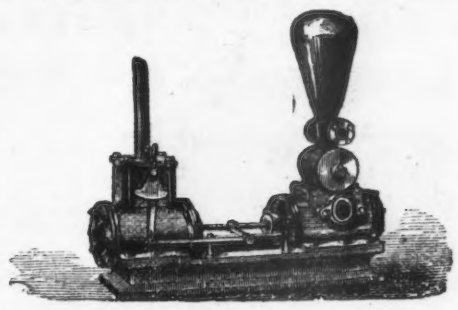

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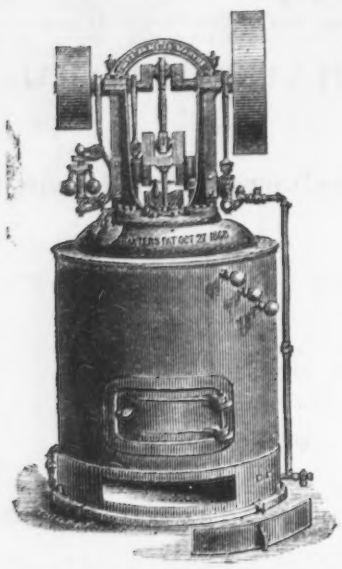

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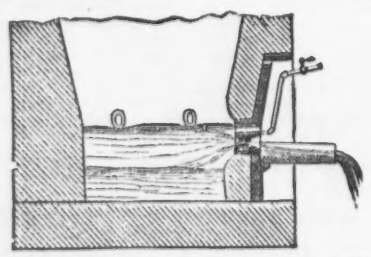

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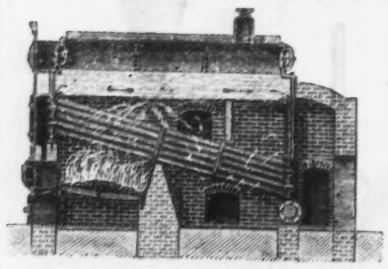

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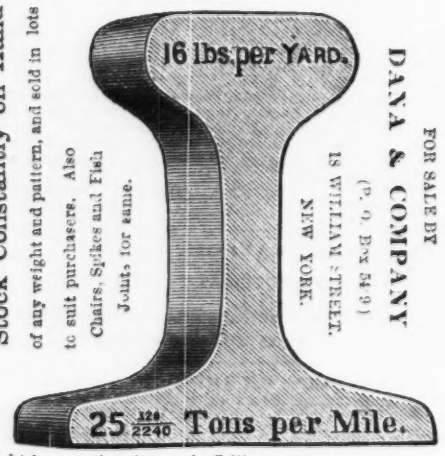

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